

Emulation Products & Technologies at Sarnoff

MILITARY QUALITY MICROCIRCUITS



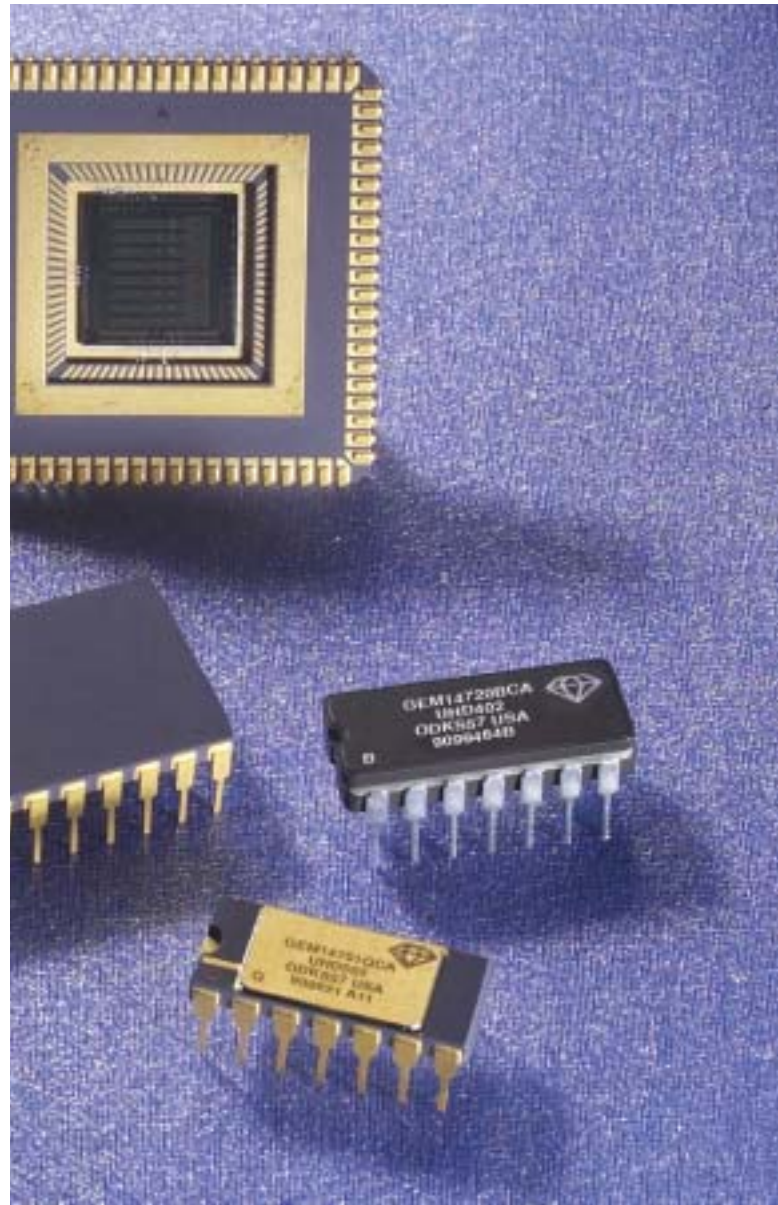
SARNOFF PROVIDES A LONG-TERM SOLUTION TO THE PROBLEM OF MICROCIRCUIT OBSOLESCENCE

Solve it here, solve it once, never have to solve it again

Military systems depend on integrated circuits (ICs) utilizing technology from the 1960s up to and including today's most advanced components. As technology advances and critical ICs are no longer commercially available, system managers are faced with the challenge of maintaining both old and new weapons systems.

In the early 1980s, the Defense Logistics Agency (DLA) recognized that microcircuit obsolescence seriously threatened the readiness and operation of many military platforms. To provide an answer to the problem of IC obsolescence, the Sarnoff Corporation, in collaboration with DLA and the Defense Supply Center Columbus (DSCC), developed the Generalized Emulation of Microcircuits (GEM). Using on-site design, test and foundry capabilities, Sarnoff manufactures military quality replacements for unavailable microcircuits.

While there are numerous options available, from Life of Type Buy to complete redesign, few offer the assurance of a continuing source through a long-term government program and commercial foundry. Sarnoff supports both production and sustainment while preventing cyclical redesigns due to microcircuit obsolescence. With emulation, readiness levels are maintained and a long-term solution is provided that reduces total ownership costs.



A continuing source, a proven solution

Sarnoff's flexible foundry provides a continuing source of form, fit, function and interface (F3I) replacements for non-procurable microcircuits. These GEM devices are supplied to existing system documentation (source control drawings, military slash sheets, standard military drawings and/or M38510 specifications) and meet the specifications of the original devices, including physical (package type, pin out), electrical (functional DC, dynamic, power), quality (device class) and environmental (temperature, hermeticity). Over 735 part types have been emulated resulting in more than 45,000 delivered devices.

GEM Technology Supports

- ◆ RTL
- ◆ DTL
- ◆ TTL, HTTL, LTTL, LSTTL
- ◆ ECL
- ◆ NMOS
- ◆ CMOS
- ◆ 100 Volt Outputs (UHD)
- ◆ Bit Slice Microprocessors (2901)
- ◆ Timer/Counters
- ◆ System Specific Parts

General Criteria for "GEMability"

- ◆ Supply voltage up to 20V
- ◆ Output voltage up to 100V
- ◆ Total pin count up to 48 pins
- ◆ Typical propagation delays of 5 ns (TTL)/3 ns (ECL)

These include parts from bipolar and MOS microcircuit technology families ranging from single function complexities to small microprocessors. Using GEM die, Sarnoff can also support turnkey hybrid requirements.

Quality Assurance

In 1999, Sarnoff was awarded full QML certification to MIL-PRF-38535 for class Q devices. This certifies that Sarnoff complies with the requirements necessary to supply SMD class Q and MIL-M/38510 class B microcircuits. All parts are fully traceable and delivered with a certificate of conformance in compliance with customer procurement requirements.

ADVANCED MICROCIRCUIT EMULATION (AME)

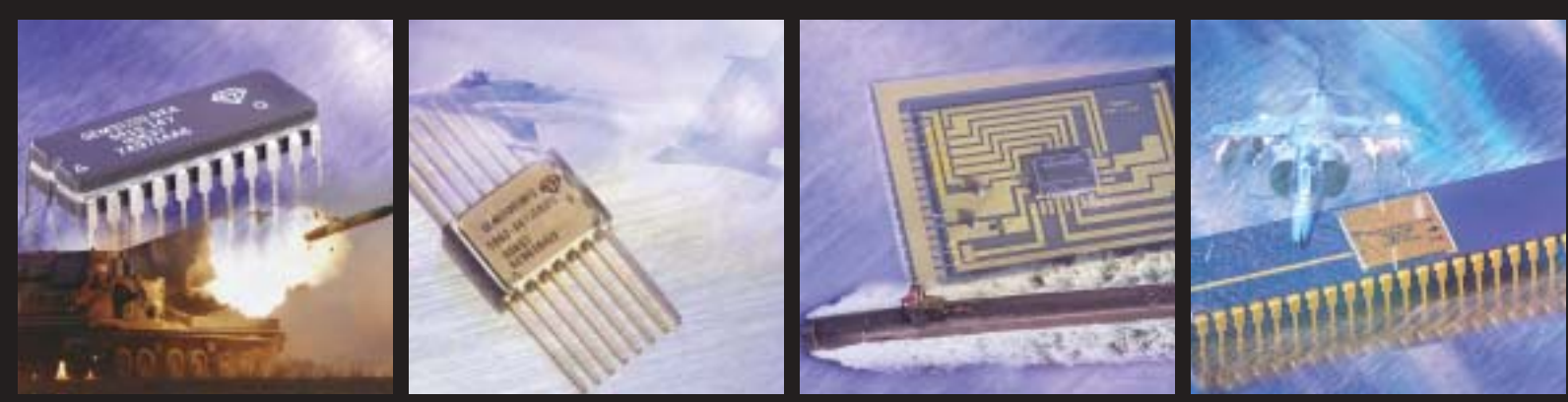
The next generation of emulation solutions

Through the AME Program, the DLA and Sarnoff are developing closely related silicon emulation fabrication processes to provide replacement parts for the next generation of obsolete parts. AME employs smaller design feature sizes (including sub-micron) to achieve higher performance microcircuits. AME's larger array sizes accommodate higher complexity devices.

AME Technology Supports

- ◆ Advanced Digital Devices
- ◆ ASICS
- ◆ Memories including ROM/PROM
- ◆ Microprocessors/Microcontrollers
- ◆ Analog Devices
- ◆ Hybrid Devices
- ◆ Engineering Services utilizing AME technology

AME technology is verified through the design, fabrication, and testing of demonstration microcircuits. The emulated ICs are tested for compliance to specifications and inserted in accordance with customer requirements.



ADVANTAGES AND APPLICATIONS OF EMULATION TECHNOLOGY

Advantages

Once a device has been emulated, a continuing source for the microcircuit is established, allowing Sarnoff to support requirements for the life of the system.

- ◆ Breaks the obsolescence cycle
- ◆ Provides solutions for the life of the system
- ◆ Reduces operating and sustainment costs
- ◆ Maintains readiness levels
- ◆ Accommodates low quantity requirements
- ◆ Prevents multiple circuit card assembly redesigns with one emulation
- ◆ Prevents production shutdown
- ◆ No changes to test programs and acceptance procedures
- ◆ Maintains system integrity with QML ICs

Example Applications

Emulation has supported multiple weapons platforms along with numerous NSN requirements and has satisfied the radiation hardness requirements of several system applications.

- ◆ Air Force: F-15, F-16, B-2, B-52, C-141, C-135, C-130, C-17, C-5, JointSTARS
- ◆ Navy: Strategic Weapon Systems (Poseidon & Trident), Aegis, Phalanx, F/A-18, F-14A, H-46, E-2C, J-2, H-3
- ◆ ARMY: MLRS, PATRIOT, M-551, AH Series Cobra, Dragon Anti-Tank Missile, SINCGARS, AN/GYK-29 Gun Display
- ◆ Marines: AV-8B
- ◆ DSCC: Multiple NSNs that support over 260 unique weapons systems

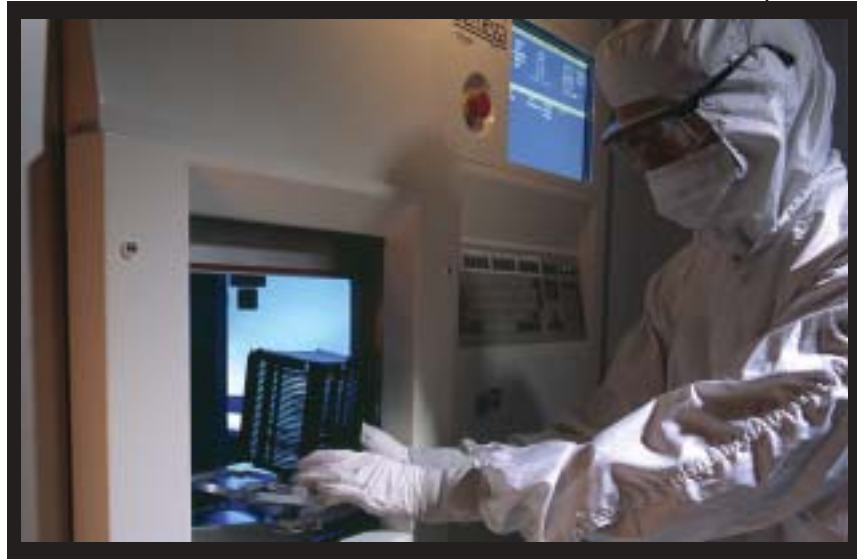
The use of emulated replacement parts is a high quality economical solution available to Program Offices, Inventory Control Points, Depots and Original Equipment Manufacturers.



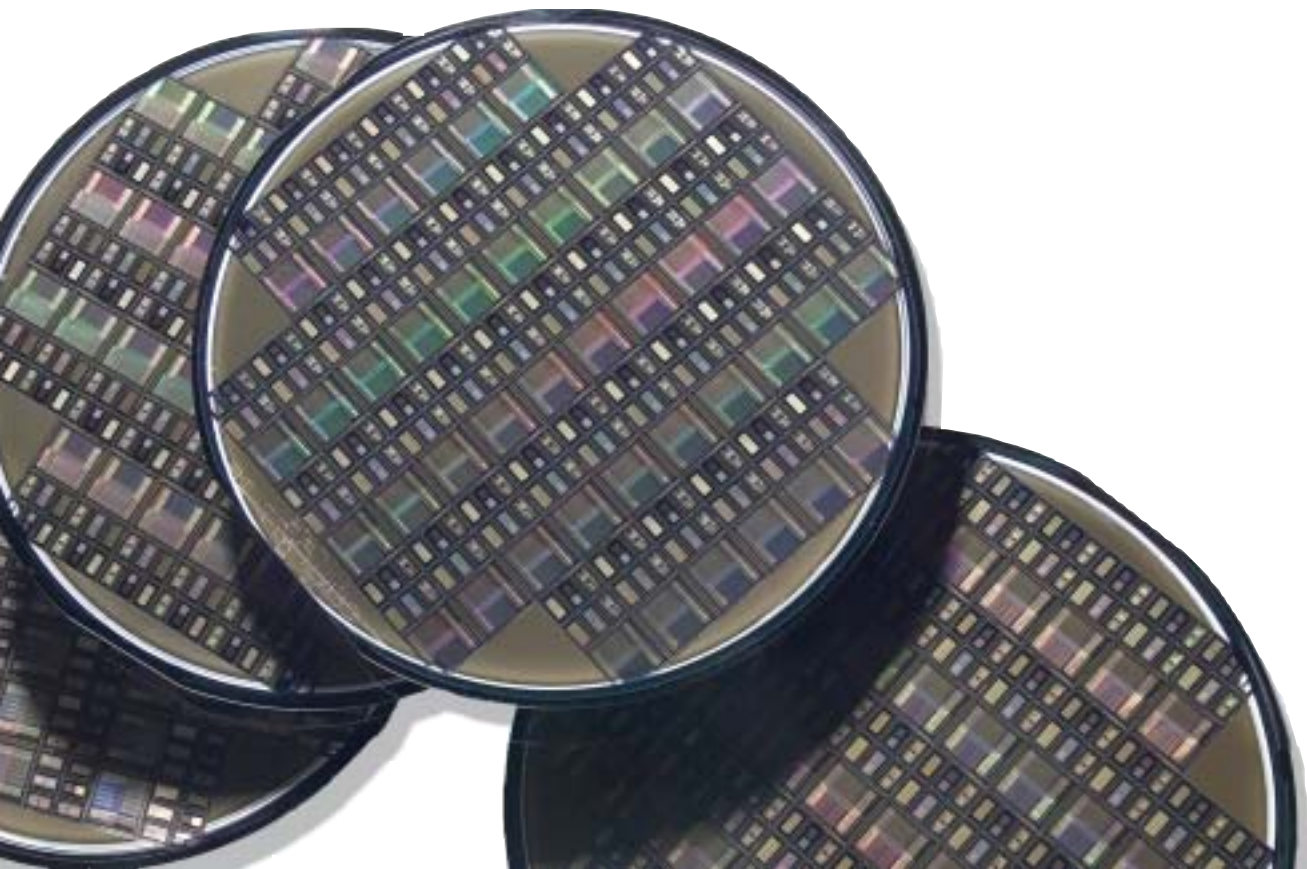
THE WAFER FOUNDRY

From IC processes to finished modules

For over 30 years, Sarnoff's captive wafer foundry has been a versatile source of silicon processing with a record of consistent success in developing and implementing new processes. In addition to supporting Emulation Products & Technologies, the wafer foundry offers many diverse services. Sarnoff has extensive experience in CMOS, BiCMOS, and bipolar processes; in sensors, MEMS devices, CCD and CMOS imagers, LCD displays; and in optical wave guides and switches, SOS, SOI, TFTs, JFETs, PIN, DMOS, BCDMOS, FETs, IGFETs, and IGBTs. Sarnoff can provide custom process module development, and shuttle services (partial processing). In addition, Sarnoff can install and run your custom process in our foundry.



It also connects you to Sarnoff's extensive capabilities in IC design, processing, electronic assembly, and environmental testing. The foundry routinely handles challenging projects for low volume production military and commercial applications. We fabricate the world's largest and most sensitive Charged Coupled Displays (CCDs). We also develop and produce advanced System-on-Chip (SOC) devices and Silicon-on-Insulator (SOI) ICs for demanding applications. Our familiarity with a broad range of technologies allows you to choose precisely the right approach for your product.





For a list of available parts, please visit our website at www.gemes.com

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