Welcome to our Spring edition of the Emulation Zone Newsletter. In this issue we cover several interesting topics. Our feature success story illustrates how the GEM program never discontinues a part once it has been emulated and how manufacturing obsolescence challenges are mitigated to make this possible. We also provide an overview of AME technologies currently in development, highlight the “Find Your Part Tool” available on the GEM/AME website, and outline the upcoming conferences we plan to attend. Hope to see you there!

SRI International, as the prime contractor for the Defense Logistics Agency’s (DLA) Generalized Emulation of Microcircuits (GEM) & Advanced Microcircuit Emulation (AME) Programs, provides technical solutions for microcircuit obsolescence. Our mission is to maintain and consistently develop microcircuit manufacturing capability for DLA and its DMSMS customer base to mitigate obsolescence and support U.S. Military weapons systems and readiness.

The GEM Program NEVER Discontinues a Product—A Success Story Example

A key objective of the GEM program is to provide a continuing source for obsolete or otherwise unavailable microcircuits. SRI, as the prime contractor, is obligated to maintain a QML certified manufacturing operation, dedicated to maintaining the capability to reproduce any part it supplies. This includes maintaining processes, materials (i.e., base wafers and long-lead packages), and procedures necessary to provide the DoD with the required GEM parts. Once a part is emulated it is never discontinued. The following success story illustrates this point.

In 1997 we received a request from McDonald Douglass Aerospace (who later merged with Boeing) to emulate part number M38510/02601BAA, NSN 5962-01-423-9501. This was used in a Heads-Up Display (HUD) on the F-15 Eagle. The M38510/02601BAA is a TTL device; a Quadruple -2 input exclusive – OR Gate, which is packaged in a ceramic 14-pin “spider” flat-pack. The generic part number is 54L86. A GEM replacement was designed and manufactured using our 1.5µm BiCMOS process and 130 parts were delivered. The GEM part number became GEM06001BAA. During the period of 1997 through 2004 multiple delivery orders were fulfilled.

Demand for this part went dormant until 2021, when we received a purchase order from DLA for part number M38510/02601BDA, NSN 5962-01-286-1609, which is the same 54L86 generic part but in a slightly different package configuration. This request was to support Tinker Air Force base and they were facing a critical work stoppage situation, so the buyer requested an expedited delivery schedule.

A new wafer lot was manufactured, and parts were assembled in an alternative 14 pin ceramic package. The new GEM part number became GEM06001BDA. Delivery to DLA was 17 weeks earlier than the promised date. Overall, shipment of the 54L86 die was 24 years after the first production shipment! The SRI GEM cage code 0DKS7 has been added to both NSNs and a permanent source of supply now exists. Not only does the GEM06001B support F-15, but also the B1-B bomber.

How The GEM Program Addresses Manufacturing Obsolescence Issues

One question we are often asked is, “How do you keep these technologies going, i.e., how do you address manufacturing obsolescence issues?” If you read the last success story article, you might be wondering the same thing. The DLA GEM programs create microcircuits using a captive manufacturing facility that includes reverse engineering, design, wafer fabrication, and electrical and mechanical testing. We continually improve equipment, processes, methods and capabilities in all areas in advance of any potential obsolescence issues. This ensures our manufacturing is not dependent on turning on systems or processes that have been dormant for several years. To maintain this capability we utilize several robust methods including advanced statistical process control (SPC), and fully qualified documented and audit procedures and methods.
A Snapshot of AME Development Efforts Underway

The (Advanced Microcircuit Emulation) AME program has been performing R&D work to develop and transition technology for future use by the GEM production program for over 25 years. AME technology development is defined in line with GEM production requirements and involves several phases including capability development, qualification and transition. Most recent developments transitioned include +20V Operational amplifiers, Fast CMOS (FCT) capability and Dual Port Random Access Memory (DPRAM).

Below is a snapshot of development efforts currently underway and a brief description of the objective. Look for more articles highlighting new introductions in future newsletter editions.

**DEVELOPMENT AREAS:**

- **40V Op Amp Technology:** 40V SOI BiCMOS technology. Develop the capability to re-establish a continuing manufacturing source for obsolete 40V analog Op Amp microcircuits. Potential to support over 1,000 microcircuits on DLA’s SMCR.

- **20V Small Dimension Analog:** 20V SOI BiCMOS technology. Develop the capability to re-establish a continuing manufacturing source for obsolete 20V small dimension analog microcircuits targeting small outline packages (TO-5, TO-46). Functions include voltage references, Op Amps, temp sensors, etc. Potential to support more than 40 unique NSNs currently used in more than 90 Weapon Systems.

- **Radhard Investigation:** Baseline investigations of performance of AME technology in harsh environments.

- **Additive Manufacturing:** Establish a low-volume manufacturing capability for ceramic microcircuit packages to support emulation of obsolete microcircuits.

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### GEM Parts List

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>5420-001</td>
<td>40V OP AMP</td>
<td>Emulation Available</td>
</tr>
<tr>
<td>5420-012</td>
<td>20V OP AMP</td>
<td>Emulation Available</td>
</tr>
</tbody>
</table>

**Has My Part Been Emulated?**

When you visit our web site at www.gemes.com (Parts tab), you can either download the entire GEM parts list or search for a specific part number. There are over 30,000 part numbers listed and the list is updated bi-annually. Parts are categorized as either “Emulation Available”, or “Emulation Capability”. The “Emulation Available” status means that an emulated device fully compliant to the part number has been successfully manufactured and qualified. An “Emulation Capability” status means that based on the part requirements and the currently available GEM arrays and technologies, this part is highly likely to be successfully emulated. A procurement specification for the part number will need to be reviewed to make a final determination. If you do not see your part number listed, contact us at geminfo@sri.com and we would be happy to review your part to see if it is an Emulation candidate.

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Recently Attended Shows

- Parts and Material Management Conference (PMMC), February 6-9, Savannah, GA
- Dixie Crow Symposium, March 21-22, Warner Robins, GA
- GOMACTech, March 20-23, San Diego, CA
- Michigan Defense Exposition (MDEX), April 19-20, Warren, MI
- DLA Supply Chain Alliance Conference, May 3-4, Richmond, VA

Upcoming Conferences/Tradeshows

- AVCOM Obsolescence Working Group Meeting, June 6-8, Fort Walton Beach, FL
- Tinker and the Primes, August 8-10, Midwest City, OK

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**CONTACT US**

Visit the Emulation program at www.gemes.com, or contact us at geminfo@sri.com. A complete GEM parts list is available at our website. Also, you can download previous newsletter editions at this site. Remember, GEM microcircuits are NEVER discontinued!

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