Space services
Providing a full scope of design, assembly, and analysis services

Electronic Systems
Overview

We offer a host of design and assembly services for custom circuit cards and components, Application Specific Integrated Circuits (ASICs), and Field Programmable Gate Arrays (FPGAs). In addition, we also perform flight qualification testing, failure analysis, and destructive physical analysis.
We have more than 30 years of experience assembling circuit cards for a wide range of complex electronic products. We maintain flexible procurement, qualification, and assembly operations. With more than 900 computers in space, our team has the experience and technological expertise to service almost any assembly need. Our processes and products are qualified to J-STD-001 Space Addendum, NASA-STD-8739.1, and NASA-STD-8793.4.

Space circuit card assembly

Space-qualified processes and equipment for circuit card assemblies from component preparation through testing and conformal coating including:

- Lead-forming and enhancement
- Qualified Manufacturers List (QML) compliance
- Programmable Read-Only Memory (PROM) programming
- Automated surface-mount and through-hole soldering capabilities
- Real-time X-ray inspection
- Printed Wiring Board (PWB) to frame bonding
- Automated adhesive dispense for component bonding
- Flying probe, in-circuit, and functional testing
- Precision hot-gas rework
- Conformal, acrylic, urethane, and parylene coatings
- Comprehensive assembly, inspection, and test strategy
- Dedicated new-product introduction team
- Rapid prototyping
- Sustaining product support
- Quick response to engineering and design changes
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**Integrated manufacturing cycle**

**Sample capabilities**

- **Customer specifications**
  - Mission-specific material screening
  - Guaranteed material quality
  - Data review, management, and retention

- **Customer designs**
  - Defense Contract Management Agency (DCMA) trusted supplier
  - Trusted foundry access through Trusted Access Program Office (TAPO)

- **Customer designs**
  - QML packaging line

- **Customer designs**
  - Space card assembly line

- **Customer designs**
  - Environment test facilities

- **Space material management**

- **Wafer fabrication**

- **Component manufacturing, test, and screening**

- **Space circuit card manufacturing**

- **Testing**

**Space material management**

Our highly qualified engineers are experienced in determining material screening needs based on mission requirements. We have developed a customized manufacturing execution system, called Solumina, to track manufacturing and screening status, store data, and demonstrate traceability compliance.

Our material management expertise includes:

- Determining required material screening based on mission requirements
- Executing required material screening including destructive physical analysis
- Guaranteeing material quality
- Data review, management, and retention
- Leveraging relationships with qualified space suppliers
- Failure analysis, including focused ion beam and space experiment modules

**Expertise in determining material screening needs based on mission requirements has yielded excellent material reliability**

**Customer specifications**

- Mission-specific material screening
- Guaranteed material quality
- Data review, management, and retention

**Assists in optimizing algorithms, creating specifications and plans, and estimating size, weight, power, and performance; partnering with an external foundry to obtain wafer material**

**Cargo specifications**

- Mission-specific material screening
- Guaranteed material quality
- Data review, management, and retention

**Enables implementation of design i.e. high pincount devices, state-of-the-art packaging, Gbps test capability, custom ASICs, advanced FPGAs, and adaptive point-of-load power systems**

**Customer designs**

- Defense Contract Management Agency (DCMA) trusted supplier
- Trusted foundry access through Trusted Access Program Office (TAPO)

**Flexible circuit card assembly services from component procurement and preparation through assembly, testing, inspection, and conformal coating**

**Flight-certified test equipment and facilities accommodate test of materials and assemblies at all stages of manufacturing**
Our integrated design team offers mission design services at any stage, from early architecture to testing. Our team has a history of delivering quality design services, efficiently and within budget. We have the experience, expertise, and facility required to deliver the best solution possible.

### Design services

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<th>Service</th>
<th>Description</th>
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<tbody>
<tr>
<td>Architecture and algorithm design</td>
<td>Map algorithm into space-suitable hardware</td>
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<td>Modeling to optimize power</td>
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<td></td>
<td>Trade-offs in implementation for enhanced radiation hardness</td>
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<td></td>
<td>Generation of hardware specifications</td>
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<td>Industry-leading technology roadmaps</td>
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<td>Logic design</td>
<td>Box, card, ASIC, and FPGA specification</td>
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<td>Partitioning of design to enhance shielding, power distribution, and fault</td>
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<td>tolerance</td>
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<td>Verification and design for testability</td>
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<tr>
<td>Physical design</td>
<td>Proprietary design libraries (low-power, mixed-signal, radiation-hardened</td>
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<td>highest reliability)</td>
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<td>Mapping hardware description language into appropriate technology and verifying timing, function and power</td>
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**We have expertise in:**
- Systems architecture
- Signal processing
- ASIC design
- Card and box design
- Mechanical
- Software
- Power
- Analog
- Reliability
- FPGAs

**Integrated development cycle**

1. **Proposal**
   - Expertise in radiation hardness, low-power design techniques, and qualifying designs for space flight enables optimized algorithms, specifications, and size, weight, and power
   - Extensive NASA space flight heritage adds an extra measure of credibility to any proposal

2. **Customer algorithms**
   - System requirements definition and analysis
     - Architecture development
     - System trades
     - Algorithm requirements and preliminary definition
     - Hardware requirements

3. **Customer architectures**
   - Hardware partition definition
     - Boxes
     - Cards
     - ASICs and FPGAs

4. **Customer specifications**
   - Hardware preliminary design

5. **Customer high-level designs**
   - Hardware detailed design

   - Products offer the building blocks to implement the design: RAD750 Central Processing Units (CPUs), digital signal processors, and reconfigurable computers
   - Size, weight, power, performance

   - Multiple technologies are available to minimize power while maximizing ability to withstand high radiation environments