

# Keep Your Design – Change Your Perspective

Comprehensive Circuit Card Assembly Services for Mission Critical Applications





Defense design and development engineers constantly face the challenge of creating smaller, more dense, faster, complex circuit boards for high-efficiency applications such as missiles, ordnance and secure communications systems. These board designs continually need to be transformed into smaller footprints with greater functionality. Microsemi Corporation specializes in the design, development and delivery of comprehensive circuit card assembly for space-constrained applications where quality and reliability cannot be compromised. Our expertise spans thirty years of successful semiconductor packaging design and assembly technologies for the defense and aerospace industries.

### **Detailed Discovery and Design Processes Keep You In Control**

To ensure the complete understanding of each customer's project and intended application, our experienced design and development engineering team performs a detailed review evaluating whether proposed projects align with Microsemi's existing processes and/or manufacturing capabilities. If a proven process is not identified, the team conducts a feasibility study to determine and implement the most effective design method to meet your specifications. We maintain strict internal design guidelines for optimum manufacturing of PCB laminate and ceramic circuit boards and substrates.

Microsemi maintains full configuration control and traceability for all our customers' design elements. The Source Control Drawings (SCDs), travelers, components, Bill of Materials (BoMs), production test software, assembly drawings and approved vendor lists are managed within our formal engineering change notification (ECN) system.



## Definitive Manufacturing Capabilities and Material Options

Our manufacturing capability is specifically targeted for the development of high-mix boards in low-to-medium volumes for the defense and aerospace industries. Operator training, equipment selection, and process development are targeted to achieve the versatility necessary to produce experimental prototypes, pre-production orders and full production. We offer a comprehensive array of services, including:

- IPC 610, Class 3 assembly
- Semiconductor package design
- Design, test and assembly
- Circuit board schematic and layout design
- Component selection
- On-shore development
- Turn-key product assembly

We are skilled at high-end fine pitch SMT assembly and inspection, as well as assembly technology of COB, CSP and BGA. We can also perform rework, if necessary. Our experienced in-house design and manufacturing engineering team can support build-to-print or design-to-specification projects through the use of well-defined and documented processes which alleviate production concerns and enhance reliability.

**Our extensive knowledge of circuit board miniaturization allows us to design and construct with proven reliability and manufacturability by extending the capabilities of traditional manufacturing equipment to higher tolerance levels.**



## Our Experience + Your Knowledge = Mutual Success

A key ingredient of our manufacturing capabilities is our unparalleled experience and ability to construct a manufacturing environment that best suits each customer's specifications. Our working knowledge and series of highly flexible production lines provide the ability to design and implement new processes. Both hardware and software are developed internally based on customer inputs and requirements, and tailored towards a specific platform. We have extensive experience in designing, fabricating and testing, as well as working with off-the-shelf test solutions. Process control elements include material traceability, solder paste height and coverage, reflow oven characterization and control, test results tracking, ionic contamination testing and a correlation database.

Our comprehensive material options include:

- Board materials from DC to 20GHz and above
- Conformal coating from prototype to full production
- A variety of solder pastes and substrates to fit each and every design need
- Ability to integrate RF shielding within compact designs



## Customer First – Quality Always.

We take your concepts through a stringent evaluation process (trade-offs) to create a design. Next, the design goes through a battery of simulation analysis tools to increase robustness, eliminate performance errors and deliver a manufacturable product. Some of these tools we utilize are:

- EMI/EMC – near and far-field radiation effects
- Current density – hot spots within design structures
- Power plane integrity analysis
- Speed, timing and performance robustness
- High-speed signal integrity/quality analysis
- Thermal and mechanical model creation and analysis
- Decoupling optimization to conserve space and cost
- High-speed controlled impedance routing
- Simultaneous Switching Output/Noise – predicts worst case conditions in time and frequency domains
- S-parameter extraction for highest possible model accuracy and analysis

In addition, we conduct both in-circuit and functional testing and are capable of performing failure analysis down to the die level. We characterize components so they can be used in the full military temperature range. Our second level test systems capture anomalies when checking the component-to-circuit-card reliability. Our IPC-A-600/610-trained QA team performs visual product inspection on each completed circuit card ensuring compliance to your specifications and standards.

## Circuit Card Capabilities At A Glance

Design and Layout Simulation Capabilities	<ul style="list-style-type: none"><li>■ Sigrity – 2D/3D FEA</li><li>■ SiSoft – Signal Integrity Software</li><li>■ Hyperlynx – PCB baseline analysis</li><li>■ CF Design – Flow and Thermal Analysis</li><li>■ Mentor Graphics PADS</li><li>■ SolidWorks</li><li>■ AutoCAD</li><li>■ Pro/Engineer 3D</li></ul>
Hardware Platforms	<ul style="list-style-type: none"><li>■ Agilent 93000 and 83000</li><li>■ Agilent 3070 in-circuit tester, bed of nails</li><li>■ Megatest Genesis II</li><li>■ Teradyne J997 and J994</li><li>■ Micro Module Systems M1X (high I/O)</li><li>■ Various auto-handler and batch load data retention systems</li></ul>
Industry Specifications	<ul style="list-style-type: none"><li>■ IPC 2221 and 2222</li><li>■ J-STD-001C</li><li>■ ASME 14.224</li><li>■ IPC 7711 and 7721</li></ul>
Manufacturing Certifications	<ul style="list-style-type: none"><li>■ ISO 9001-2000/AS9100</li><li>■ MIL-PRF-38534 (H &amp; K)</li><li>■ IPC 610 – Class 3</li><li>■ J-STD-001</li><li>■ MIL-PRF-38535 (B)</li><li>■ DoD</li><li>■ ISO 14001 (future)</li></ul>
Manufacturing Capabilities	<ul style="list-style-type: none"><li>■ Multiple surface mount technology (SMT) lines with assembly including ball grid array (BGA) and FBGA to 0.5mm, chip scale packages (CSP), TSOP, PLCC and QFP</li><li>■ Chip-on-board (COB), wire bond or flip chip attach ≤ 200 micron pitch</li><li>■ Leaded and Lead-Free Assembly</li><li>■ Double-sided and through-hole assembly</li><li>■ Press fit connectors</li><li>■ 01005 devices</li><li>■ Stacking and underfill of components</li><li>■ Thermal mounts</li><li>■ Conductive epoxy attach for low temperature substrates</li><li>■ Conformal coating</li><li>■ ESS systems</li><li>■ Environmental testing</li></ul>
Verification Tools	<ul style="list-style-type: none"><li>■ F1 optical inspection system</li><li>■ YTX-3000 X-ray system</li><li>■ X-ray fluorescence spectroscopy (XRF)</li><li>■ Scanning acoustic microscopy (SAM)</li><li>■ Air-Vac DRS 24NC.2D BGA/SMD rework system</li></ul>
Test Software Languages	<ul style="list-style-type: none"><li>■ UNIX®</li><li>■ C++</li><li>■ BASIC</li><li>■ QTL®</li><li>■ ASSEMBLY</li></ul>

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## *Work With People Who See The World The Way You Do ...*

With Microsemi Corporation, you will be working with engineers who understand your issues and speak your language. Our team is committed to helping you achieve the solution that is best suited for your application.

Look to us to design multi-chip packaging, SiP, card assembly, and integrated system or box builds. We have the knowledge and expertise to solve your circuit card assembly challenges.



Microsemi Corporation (NASDAQ: MSCC) delivers sophisticated multi-chip packages, high-efficiency memory devices and build-to-print electromechanical assemblies that address the unique size, performance and quality requirements in the defense and aerospace industries. Providing advanced embedded component solutions for defense and aerospace applications with specific design and operational requirements has established Microsemi Corporation as a trusted resource and valued partner.



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