Next Page

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Expiration Date: [ ]

# DEFENSE INDUSTRIAL BASE ASSESSMENT:
# Bare Printed Circuit Board Manufacturers

## SCOPE OF ASSESSMENT

The U.S. Department of Commerce, Bureau of Industry and Security (BIS), Office of Technology Evaluation, in coordination with the United States Navy, Naval Surface Warfare Center, Crane Division (NSWC Crane) is conducting an assessment of the U.S. industrial base for manufacturing bare printed circuit board products. The primary goal of this study is to assist the US defense community in understanding the health and competitiveness of organizations manufacturing bare printed circuit boards for commercial and U.S. Government applications at facilities located in the United States.

The Secretary of the Navy is the DOD Defense Executive Agent for printed circuit board technology. NSWC Crane is the DOD Executive Agent technical lead for printed circuit board and interconnect technology. NSWC Crane provides acquisition engineering, in-service engineering, and technical support for sensors, electornics, electronic warfare, and special warfare weapons.

## RESPONSE TO THIS SURVEY IS REQUIRED BY LAW

A response to this survey is required by law (50 U.S.C. App. Sec. 2155). Failure to respond can result in a maximum fine of $10,000, imprisonment of up to one year, or both. Information furnished herewith is deemed confidential and will not be published or disclosed except in accordance with Section 705 of the Defense Production Act of 1950, as amended (50 U.S.C App. Sec. 2155). Section 705 prohibits the publication or disclosure of this information unless the President determines that its withholding is contrary to the national defense. Information will not be shared with any non-government entity, other than in aggregate form. The information will be protected pursuant to the appropriate exemptions from disclosure under the Freedom of Information Act (FOIA), should it be the subject of a FOIA request.

Not withstanding any other provision of law, no person is required to respond to nor shall a person be subject to a penalty for failure to comply with a collection of information subject to the requirements of the Paperwork Reduction Act unless that collection of information displays a currently valid OMB Control Number.

## BURDEN ESTIMATE AND REQUEST FOR COMMENT

Public reporting burden for this collection of information is estimated to average 13 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information to BIS Information Collection Officer, Room 6883, Bureau of Industry and Security, U.S. Department of Commerce, Washington, D.C. 20230, and to the Office of Management and Budget, Paperwork Reduction Project (OMB Control No. 0694-0119), Washington, D.C. 20503.

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

## TABLE OF CONTENTS

Previous Page | Return to Table of Contents | Next Page

## Section I: GENERAL INSTRUCTIONS

| | |
|---|---|
| A. | Your facility is required to complete this bare printed circuit board survey using an Excel template, which can be downloaded from the BIS website: http://bis.doc.gov/printedcircuitboards. If you are not able to download the survey document, at your requrest BIS staff will e-mail the Excel survey template directly to you.<br><br>For your convenience, a PDF verson of the survey and required drop-down content is available on the BIS website to aid internal data collection. DO NOT SUBMIT the PDF version of the survey as your response to BIS. Should this occur, your facility will be required to resubmit the survey in the requested Excel format. |
| B. | Respond to every question. Surveys that are not fully completed will be returned for completion. Use the comment boxes to provide any information to supplement responses provided in the survey form. Make sure to record a complete answer in the cell provided, even if the cell does not appear to expand to fit all the information.<br><br>**DO NOT CUT AND PASTE RESPONSES WITHIN THIS SURVEY.** Survey inputs should be completed by typing in responses or by use of a drop-down menu. The use of cut and paste can corrupt the survey template. If your survey response is corrupted as a result of cut and paste responses, a new survey will be sent to your organization for immediate completion. |
| C. | **Do not disclose any classified information in this survey form.** |
| D. | Estimates are often acceptable (and in some sections encouraged), but in sections that do not explicitly allow estimates you must contact BIS survey support staff before including estimates. |
| E. | Upon completion of the survey, final review, and certification on the final page, **transmit the survey via e-mail to**: printedcircuitboards@bis.doc.gov.<br><br>To arrange for the completed survey to be delivered on CD-ROM or DVD disc by private carrier, contact BIS survey staff. |
| F. | Questions related to this Excel survey should be directed to:<br><br>printedcircuitboards@bis.doc.gov. (E-mail is the preferred method of contact).<br><br>You may also speak with a member of BIS survey support staff by calling: Stamen Borisson, 202-482-3893; Mark Crawford, 202-482-8239. |
| G. | For questions related to the overall scope of this Defense Industrial Base assessment, contact:<br><br>Brad Botwin, Director, Industrial Studies<br>Office of Technology Evaluation, Room 1093<br>U.S. Department of Commerce<br>1401 Constitution Avenue, NW<br>Washington, DC 20230<br><br>DO NOT submit completed surveys to Mr. Botwin's postal or e-mail address; all surveys must be submitted electronically to printedcircuitboards@bis.doc.gov. |

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

**Section II: Definitions**

| Term | Definition |
|---|---|
| Applied Research | Systematic study to gain knowledge or understanding necessary to determine the means by which a recognized and specific need may be met. This activity includes work leading to the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes. |
| Authorizing Official | Executive officer of the organization or business unit or other individual who has the authority to execute this survey on behalf of the organization. |
| Bare Printed Circuit Board | A completed, tested circuit board ready to be populated with components to create a working system. |
| Basic Research | Systematic, scientific study directed toward greater knowledge or understanding of the fundamental aspects of phenomena and of observable facts. |
| Board Thickness | The overall thickness of the base material, all conductive material deposited thereon, and solder mask. |
| Commercial and Government Entity (CAGE) Code | Commercial and Government Entity (CAGE) Code identifies companies doing or wishing to do business with the U.S. Federal Government. The code is used to support mechanized government systems and provides a standardized method of identifying a given facility at a specific location. Find CAGE codes at http://www.logisticsinformationservice.dla.mil/BINCS/begin_search.aspx. |
| Commercially Sensitive Information (CSI) | Privileged or proprietary information which, if compromised through alteration, corruption, loss, misuse, or unauthorized disclosure, could cause serious harm to the organization owning it. |
| Customer | Any organization (external or internal entity) for which your company manufactures bare circuit board products. |
| Data Universal Numbering System (DUNS) | A nine-digit numbering system that uniquely identifies an individual business. Find DUNS numbers at http://fedgov.dnb.com/webform. |
| Export Controls | 1) Regulations administered by the Bureau of Industry and Security (BIS), U.S. Department of Commerce governing the export of dual-use technologies; 2) International Traffic in Arms Regulations (ITAR) administered by the U.S. Department of State governing products and services provided specifically for defense applications. |
| External Cloud Service Provider | A service model in which a company employs an external third-party service provider to maintain, manage, and back up business data at a remote location away from the company's operating facilities. The use of shared third-party storage infrastructure by businesses can reduce capital, operations, storage, and security requirements, significantly lowering costs. Data is transmitted between the company and the cloud service provider via networks as needed. |
| External Data Storage Provider | A business that provides external data storage services to your company for data that is not currently held in your company's main data network work systems. |
| Flex | A flexible circuit board with printed circuitry on flexible base material consisting of one or more layers |
| Full Time Equivalent (FTE) Employees | Employees who work for 40 hours in a normal work week. Convert part-time employees into "full time equivalents" by taking their work hours as a fraction of 40 hours. |
| Microvia | A conductive hole with a diameter of 0.005" or less that connects layers of a multi-layer printed circuit board. Microvias are used in blind and buried vias, but not for through-the-board connections. The term is often used to refer to any small geometry connection holes created by laser drilling. |
| North American Industry Classification System (NAICS) Code | North American Industry Classification System (NAICS) codes identify the category of product(s) or service(s) provided by an organization. Find NAICS codes at http://www.census.gov/epcd/www/naics.html |
| Planarization | Planarization is a mechanical sanding/polishing process to create a flat or planar surface across copper conductor on circuit boards. |
| Pre-Preg | A sheet of base dielectric laminate incorporating reinforcing material (typically glass fabric/mat, or aramid fabric/mat) impregnated with a resin cured to an intermediate stage (i.e. B-stage resin) where it is not fully cured. |
| Product/Process Development | Conceptualization and development of a product prior to the production of the product for customers. |
| Qualified Manufacturers' List (QML) | A list of manufacturers who have had their products examined and tested and who have satisfied all applicable U.S. Department of Defense qualification requirements for that product. |
| Qualifed Products List (QPL) | A list of products, or family of products, that have met the qualification requirements set forth in the applicable specification, including appropriate product identification, tests or qualification reference, and the name and plant address of the manufacturer and authorized distributor. |
| Rigid | A rigid circuit board composed of resin and reinforcing material such as fiberglass that contains an electric conductor in a defined path to connect with devices and terminal connectors. |
| Rigid-Flex | One or more rigid circuit boards connected by a to a flexible circuit board. |
| Service | An intangible product (contrasted to a good, which is a tangible product). Services typically cannot be stored or transported, are instantly perishable, and come into existence at the time they are bought and consumed. |
| Single Source | An organization that is designated as the only accepted source for the supply of parts, components, materials, or services, even though other sources with equivalent technical know-how and production capability may exist. |
| Sole Source | An organization that is the only source for the supply of parts, components, materials, or services. No alternative U.S. or non-U.S. based suppliers exist other than the current supplier. |
| Supplier | An entity from which your organization obtains inputs. A supplier may be another firm with which you have a contractual relationship, or it may be another facility owned by the same parent organization. The inputs may be goods or services. |
| United States | The "United States" or "U.S." includes the 50 states, Puerto Rico, the District of Columbia, the island of Guam, the Trust Territories, and the U.S. Virgin Islands. |
| Via | A plated feed-through hole that is used to route a trace vertically in the board from one layer to another. Vias are not used as connecting devices for component leads or for anchoring reinforcing material. |
| Via Structure | A description of vias (including microvias) incorporated in a multilayer circuit board product. |

Previous Page | Return to Table of Contents | Next Page

| Section III | Respondent Profile | | | |
|---|---|---|---|---|
| A. | Select the description that best identifies your organization: | | | |
| B. | What capabilities does this facility have related to the production of bare printed circuit boards? | Design Capability | Manufacture Capability | Assembly Capability |
| | | | | |
| | If your organization has multiple facilities in the United States that manufacture bare printed circuit boards you must provide separate survey responses for each facility. Indicate at right the description that best describes your organization's circuit board manufacturing structure.<br><br>1. Organization has a single facility in the U.S.<br>2. Organization has multiple facilities, but only one bare circuit board manufacturing facility in the U.S.<br>3. Organization has multiple facilities in the U.S. with bare circuit board manufacturing capabilities. | | | |

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

## Section 1a: Organization Information

**A.** Provide the following information for this facility.

| | |
|---|---|
| Facility/Organization Name | |
| Street Address | |
| City | |
| State | |
| Zip Code | |
| Website | |
| Phone Number | |
| Primary CAGE Code | |

**B.** Provide the following information for your parent organization(s), if applicable.

| | Parent Organization |
|---|---|
| Parent Name | |
| Street Address | |
| City | |
| State/Province | |
| Country | |
| Postal Code/Zip Code | |
| Parent Primary CAGE Code | |

| | | | |
|---|---|---|---|
| C. | Is your organization publicly traded or privately held? | | If your organization is publicly traded, identify its stock ticker symbol. |

D. Point of Contact regarding this survey:

| Name | Title | Phone Number | E-mail Address | State |
|---|---|---|---|---|
| | | | | |

| | |
|---|---|
| Comments: | |

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

**Section 1b: Organization Information (Cont.)**

A. Identify and rank in descending order all entities that directly or indirectly own or have beneficial ownership of five percent or more of your organization (including parent companies and others):

| Entity Name | Percent of Company Held | Street Address | City | State/Region | Country |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

C. Please provide the following identification codes (see definitions), as applicable, to this facility.

| Data Universal Numbering System (DUNS) Code(s) | | NAICS (6-digit) Code(s)* | |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| Find DUNS numbers at: http://fedgov.dnb.com/webform | | Find NAICS codes at: http://www.census.gov/epcd/www/naics.html | |
| | | | |
| | | | |
| | | | |
| | | | |

D. Indicate if your organization qualifies as any of the following types of business:

| | | |
|---|---|---|
| 1 | A small business enterprise (as defined by the Small Business Administration) | |
| 2 | 8(a) Firm (as defined by the Small Business Administration) | |
| 3 | A historically underutilized business zone (HUBZone) | |
| 4 | A minority-owned business | |
| 5 | A woman-owned business | |
| 6 | A veteran-owned or service-disabled veteran-owned business | |

| Comments: | |
|---|---|

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

**Section 1c: Organization Information (continued)**

| | | | |
|---|---|---|---|
| A. | Estimate the percentage of this facility's bare printed circuit board sales attributable to COMMERCIAL end uses: | | |
| | Estimate the percentage of this facility's bare printed circuit board sales attributable to DEFENSE end uses: | | |

**Commercial Market Segments**

B. From the list below, estimate the percentage of this facility's bare circuit board sales attributable to each COMMERCIAL end use.

| Commercial End Use | % of Bare Circuit Board Sales | Commercial End Use | | % of Bare Circuit Board Sales |
|---|---|---|---|---|
| Aerospace | | Industrial Electronics | | |
| Automotive | | Medical/Healthcare | | |
| Communications | | Marine (surface and underwater) | | |
| Computers/Business Equipment | | Space | | |
| Consumer Goods | | Other | (specify here) | |

**Defense Market Segments**

C. From the list below, estimate the percentage of this facility's bare circuit board sales attributable to each DEFENSE end use.

| Defense End Use | % of Bare Circuit Board Sales | Defense End Use | | % of Bare Circuit Board Sales |
|---|---|---|---|---|
| Aerospace | | Missiles | | |
| Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) | | Marine (surface and underwater) | | |
| Electronics | | Space | | |
| Ground Vehicles | | Other | (specify here) | |

| Comments: | |
|---|---|

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

## Section 2: Mergers, Acquisitions, Divestitures, and Joint Ventures

### A. Mergers, Acquisitions, Divestitures

How many mergers, acquisitions, and divestitures has your organization had since 2012?

Identify and describe your organization's five most recent mergers, acquisitions, and divestitures, if applicable.

| | Organization Name | Type of Activity | Country | Year | Primary Objective | Explain |
|---|---|---|---|---|---|---|
| 1. | | | | | | |
| 2. | | | | | | |
| 3. | | | | | | |
| 4. | | | | | | |
| 5. | | | | | | |

### B. Joint Ventures

How many joint ventures does your organization currently participate in?

Identify your organization's current joint venture relationships, including public/private R&D partnerships. Be sure to provide a description of the joint venture's purpose (e.g. patent licensing, co-production, product integration, after-market support, etc.):

| | Organization/Entity Name | Country | Year Initiated | Primary Purpose of Relationship | Explain |
|---|---|---|---|---|---|
| 1. | | | | | |
| 2. | | | | | |
| 3. | | | | | |
| 4. | | | | | |
| 5. | | | | | |
| 6. | | | | | |
| 7. | | | | | |
| 8. | | | | | |
| 9. | | | | | |
| 10. | | | | | |
| 11. | | | | | |
| 12. | | | | | |
| 13. | | | | | |
| 14. | | | | | |
| 15. | | | | | |

Comments:

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

## Section 3a: Customers

A. Select the primary method this facility uses to find business opportunities with the U.S. Government:

Explain:

B. Since 2012 has this facility rejected business opportunities due to any of the following?

| | Yes/No | Explain |
|---|---|---|
| Circuit board panel production run too small | | |
| Insufficient order frequency | | |
| Insufficient dollar value of job | | |
| Insufficient dollar value of recurring business opportunity | | |
| Complexity of job | | |
| Customer credit rating | | |
| Additional work not needed | | |
| Other criteria (specify here) | | |

C. Identify this facility's top 5 U.S. and top 5 non-U.S. direct customers by sales for the past four years. A direct customer is the immediate entity to which you sell your products/services. Customers can include other business units/divisions within your parent organization. Indicate the type of customer and their location.

**Top U.S.-Based Customers**

| | Customer Name | Type of Customer | Primary End Use | Customer City | Customer State |
|---|---|---|---|---|---|
| 1. | | | | | |
| 2. | | | | | |
| 3. | | | | | |
| 4. | | | | | |
| 5. | | | | | |

**Top Non-U.S.-Based Customers**

| | Customer Name | Type of Customer | Primary End Use | Customer City | Customer Country |
|---|---|---|---|---|---|
| 1. | | | | | |
| 2. | | | | | |
| 3. | | | | | |
| 4. | | | | | |
| 5. | | | | | |

Comments:

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

**Section 3b: Competitors**

A. For each of the following factors, identify whether bare circuit board manufacturers located inside the U.S. or outside the U.S. possess competitive advantages.

| Factor | | Location with Advantage | Explain |
|---|---|---|---|
| Labor Costs | | | |
| Environmental Compliance Costs | | | |
| Materials Costs | | | |
| Equipment Costs | | | |
| Building Space Costs | | | |
| R&D Costs | | | |
| Supply of Skilled Workers | | | |
| Export Controls | | | |
| Overall Finished Board Price | | | |
| Quality | | | |
| Performance | | | |
| Lead Time | | | |
| Reduced Process Variability | | | |
| Reduced Cost | | | |
| Safety Requirements | | | |
| Increased Yield | | | |
| Other | (specify here) | | |
| Other | (specify here) | | |

B. Identify your organization's leading U.S. and non-U.S. competitors in the manufacture of bare circuit boards, and select their primary competitive attribute.

**Top U.S. Competitors**

| | Competitor Name | State | Primary Competitive Attribute | Explain |
|---|---|---|---|---|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |

**Top Non-U.S. Competitors**

| | Competitor Name | Country | Primary Competitive Attribute | Explain |
|---|---|---|---|---|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |

Comments:

Previous Page | Return to Table of Contents | Next Page

## Section 4a: Participation in USG Programs

### USG Agency Support

A. From the list of USG agencies below, select those this facility supports or has supported since 2012. If you support an agency that is not listed, identify it in an "Other" box.

| | | | | | | |
|---|---|---|---|---|---|---|
| U.S. Air Force | | Department of Homeland Security (DHS) | | Other | (select from dropdown) | |
| U.S. Army | | National Aeronautics & Space Administration (NASA) | | Other | (select from dropdown) | |
| U.S. Navy | | National Oceanic & Atmospheric Administration (NOAA) | | Other | (select from dropdown) | |
| U.S. Marine Corps | | Department of Energy (DOE) | | Other | (specify here) | |
| U.S. Intelligence Community (such as CIA, NGA, NRO, NSA) | | Missile Defense Agency (MDA) | | Other | (specify here) | |

### USG Program Identification

B. Estimate the total number of USG programs this facility has directly or indirectly supported since 2012.

Identify the USG programs this facility has supported since 2012, and indicate which types of bare circuit boards this facility has manufactured for each program.

| | USG Program Name | U.S. Government Agency | Bare Circuit Board Types Supporting USG Program | | |
|---|---|---|---|---|---|
| | | | Rigid | Flex | Rigid-Flex |
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | |
| 11 | | | | | |
| 12 | | | | | |
| 13 | | | | | |
| 14 | | | | | |
| 15 | | | | | |
| 16 | | | | | |
| 17 | | | | | |
| 18 | | | | | |
| 19 | | | | | |
| 20 | | | | | |

Comments:

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

## Section 4b: USG Interactions

**A.**

| | |
|---|---|
| Does this facility consider itself dependent on U.S. Government programs for its continued viability? | |
| Explain | |
| If this facility's bare circuit board manufacturing supports USG programs, whether directly or indirectly, are the associated manufacturing lines integrated with, or separate from, its commercial manufacturing lines? | |
| Explain | |

**B.** From the list below, select impacts that a sudden change in direct and/or indirect U.S. Government defense demand for electronic products containing bare circuit boards would likely have on your organization and provide an explanation where applicable:

| Business Operation | Impact of sudden DECREASE in USG Defense Demand | Impact of sudden INCREASE in USG Defense Demand | Explanation |
|---|---|---|---|
| Capital Expenditures | | | |
| Research & Development Expenditures | | | |
| Participation in USG Contracts | | | |
| Product/Service Costs | | | |
| Organization Viability/Solvency | | | |
| Personnel with Key Skills | | | |
| Number of Product/Service Lines | | | |
| Pursuit of Non-U.S. Customers | | | |
| Level of Key Production Equipment | | | |
| Movement of Operations to Non-U.S. locations | | | |
| Other (specify here) | | | |
| Other (specify here) | | | |

| | |
|---|---|
| Comments: | |

Previous Page | Return to Table of Contents | Next Page

## Section 5a: Manufacturing Capabilities

A. Identify the types of bare circuit boards that this facility is currently capable of manufacturing:

| | Tin-Lead | Lead-Free |
|---|---|---|
| Rigid Conventional Board (single-sided or double-sided) | | |
| Rigid Multilayer Board | | |
| Rigid High Speed Boards | | |
| Rigid High Frequency Boards | | |
| Rigid Microwave Boards | | |
| Flexible Conventional Board (single-sided or double-sided) | | |
| Flexible Multilayer Board | | |
| Flexible High Speed Boards | | |
| Flexible High Frequency Boards | | |
| Flexible Microwave Boards | | |
| Rigid-Flex Hybrid Boards | | |
| Integrated Circuit Package Substrates | | |

B. What is the minimum inner layer (core) thickness of circuit board components that this facility can produce? | What is the maximum bare circuit board thickness that this facility can achieve?

C. Does this facility manufacture printed electronics (PE)?

"Printed Electronics" refers to the use of additive printing methods on flexible substrates such as plastic, paper, epoxy-fiberglass, textiles, and other electronic devices such as discrete electronic component, sensors, and others.

| | | |
|---|---|---|
| If yes, identify the PE business activities this facility engages in: | | Explain: |
| If yes, identify the PE business sectors this facility supports: | | Explain: |

D. For each type of bare circuit board layer listed below, identify this facility's standard and minimum trace widths, based on specified copper conductor weights:

| | Trace Width (in inches) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0.25 oz copper | 0.5 oz copper | 1 oz copper | 2 oz copper | 3-5 oz copper | 6-10 oz copper | 10+ oz copper |
| External Layer: Standard | | | | | | | |
| External Layer: Minimum | | | | | | | |
| Internal Layer: Standard | | | | | | | |
| Internal Layer: Minimum | | | | | | | |

E. For each type of bare circuit board layer listed below, identify this facility's standard and minimum space widths, based on specified copper conductor weights:

| | Space Width (in inches) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0.25 oz copper | 0.5 oz copper | 1 oz copper | 2 oz copper | 3-5 oz copper | 6-10 oz copper | 10+ oz copper |
| External Layer: Standard | | | | | | | |
| External Layer: Minimum | | | | | | | |
| Internal Layer: Standard | | | | | | | |
| Internal Layer: Minimum | | | | | | | |

Comments:

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

**Section 5b: Manufacturing Capabilities (cont.)**

A. Identify the bare circuit board manufacturing processes that this facility is capable of employing:

| Process | Capable of Using | Currently Use | Process | Capable of Using | Currently Use |
|---|---|---|---|---|---|
| Photo imaging | | | Thermal management structures | | |
| Direct imaging | | | Automated electroless copper plating | | |
| Screen printing | | | Automated electrolytic copper plating | | |
| Controlled drilling/milling | | | Direct metallization plating | | |
| Laser ablation | | | Hot air solder level tin-lead | | |
| Fully additive plating | | | Hot air solder level lead-free | | |
| Z-axis interconnect technology | | | LPI solder mask | | |
| Embedded devices (e.g. resistors, capacitors, etc.) | | | Dry film solder mask | | |
| Opto-electronic structures | | | Other (specify here) | | |

B. Identify this facility's maximum capability for each of the following bare circuit board production factors:

| Factor | Maximum per Board | Explanation |
|---|---|---|
| Circuit layers | | |
| Sequential laminations | | |
| Impedance structures | | |
| Stacked micro vias | | |
| Staggered micro vias | | |

C. Identify where the bare circuit board via fill and planarization manufacturing activities are performed for this facility:

| | -Yes/No- | Process Method | Explanation |
|---|---|---|---|
| This facility | | | |
| Other company-owned U.S. facilities | | | |
| Other company-owned non-U.S. facilities | | | |
| Contractor-operated U.S. facilities | | | |
| Contractor-operated non-U.S. facilities | | | |

D. Identify which of following processes associated with via structures this facility is capable of performing:

| Via Formation | -Yes/No- | Via Formation | -Yes/No- | Drilling Process | Maximum aspect ratio |
|---|---|---|---|---|---|
| Etchback | | Plasma etch | | Laser-formed micro via | |
| Chemical smear removal | | Laser via formation | | Mechanically drilled via: through-board | |
| Micro-via solid copper fill | | Nonconductive via fill | | Mechanically drilled via: controlled-depth | |

Comments:

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

## Section 5c: Manufacturing Standards

A. Identify the standards that this facility currently employs and indicate whether you have a formal certification or apply the standards informally.

| Standard | | Use | Explain |
|---|---|---|---|
| MIL-PRF 55110 | | | |
| MIL-PRF 50884 | | | |
| MIL-PRF 31032 | | | |
| ISO 9001 | | | |
| AS 9100 | | | |
| NADCAP | | | |
| IPC 1071 | | | |
| IPC 6011 | | | |
| IPC 6012 | | | |
| IPC 6013 | | | |
| IPC 6015 | | | |
| IPC 6016 | | | |
| IPC 6017 | | | |
| IPC 6018 | | | |
| Other | (specify here) | | |
| Other | (specify here) | | |

B. Does this facility have an active technical review board? | Explain:

C. Identify the primary final circuit board inspection method this facility uses to assure that manufactured products meet performance requirements. | Are first article inspection capabilities at this facility compliant with AS 9102? | Explain:

D. Identify the forms of testing that this facility uses in manufacturing to assure performance and adherence to operational requirements.

| Testing Form | -Yes/No- | Testing Form | -Yes/No- |
|---|---|---|---|
| Flying Probe | | Impedance Testing with Plots | |
| Bed-of-Nails | | Interconnect Stress Testing (IST) | |
| Isolation 250 Volts DC, 100 MegaOhm Minimum | | Highly Accelerated Stress Testing (HAST) | |
| Continuity 10 Volts DC, 10 Ohm Maximum | | Highly Accelerated Life Testing (HALT) | |
| Test all end points, no phase testing | | Highly Accelerated Thermal Shock (HATS) | |

E. Does this facility use Statistical Process Control with TrueChem or equivalent software specifically to control and automate the management of chemistries, coatings, and associated circuit board production processes?

Does this facility employ Material Requirements Planning (MRP) software in the operation of its circuit board manufacturing facilities in the U.S.?

Comments:

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

## Section 5d: Manufacturing Production & Capacity

A. For each of the years 2012-2015 estimate the average weekly number of inner layers (cores) and completed circuit board panels that this facility manufactured:

**Inner Layer (Core):**
A sheet of copper clad dielectric with one or both sides bearing circuit patterns.
**Panel:**
(1) a double-sided or single-sided rigid structure (double-sided or single-sided panel) or
(2) two or more inner cores laminated together forming a multilayered, rigid structure (multilayer panel).

| | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|
| Average Weekly Inner Layers (Cores) Manufactured | | | | |
| Average Weekly Panels Manufactured | | | | |

B. Identify the bare circuit board panel sizes that this facility can produce with its current manufacturing equipment:

| Panel Size: | 24x36 | 24x30 | 21x24 | 18x24 | 12x24 | 12x18 | 9x12 | Other |
|---|---|---|---|---|---|---|---|---|
| Capability: | | | | | | | | |
| Explain: | | | | | | | | |

C. Estimate the 2015 rated weekly manufacturing capacity of this facility in units:

| Inner Layers (Cores) | Panels |
|---|---|
| | |

D.

| | |
|---|---|
| How many 8-hour production shifts does this facility typically operate per day? | |
| How many 8-hour production shifts per day COULD this facility operate practically? | |
| How many 8-hour front-end engineering shifts does this facility typically operate per day? | |
| How many 8-hour front-end engineering shifts perd day COULD this facility operate practically? | |
| Explain: | |

E. Estimate this facility's average manufacturing utilization rate for each of the years 2012-2015, as a percentage of production possible under a 7 day-per-week, 24-hour-per-day operation.

Note: a 100% utilization rate equals full operation with no downtime beyond that necessary for maintenance

| Examples: Assuming little maintenance downtime, one 8-hour shift, 5 days per week is approximately 25% capacity utilization; two 8-hour shifts, 7 days per week is approximately 65% capacity utilization. | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|
| | | | | |

F.

| | |
|---|---|
| Estimate how many weeks it would take to raise this facility's production from current levels to 100% capacity utilization: If this facility already operates at 100% capacity utilization, respond with a "0". | |
| Estimate how many weeks it would take to raise this facility's production from current levels to 150% of your current capacity utilization: | |
| Explain: | |

G. Identify which of the factors below would limit this facility's ability to raise its bare circuit board manufacturing utilization rate to 100% (maximum current capacity) and to 150% (50% increase from current maximum capacity) to meet a surge in demand.

| | Factor | Scenario: 100% | Scenario: 150% | Explanation |
|---|---|---|---|---|
| 1 | Amount of equipment | | | |
| 2 | Availability of equipment | | | |
| 3 | Manufacturing space | | | |
| 4 | Availability or cost of workforce | | | |
| 5 | Quality control | | | |
| 6 | Availability of input materials | | | |
| 7 | Other (specify in explanation) | | | |

Comments:

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

**Section 5e: Manufacturing Production & Capacity (continued)**

A. How does this facility anticipate the range of bare circuit board product lines it manufactures will change by 2020?

| Board Type | Anticipated Change | Explain |
|---|---|---|
| Rigid Conventional Board (single-sided or double-sided) | | |
| Rigid Multilayer Board | | |
| Rigid High Speed Boards | | |
| Rigid High Frequency Boards | | |
| Rigid Microwave Boards | | |
| Flexible Conventional Board (single-sided or double-sided) | | |
| Flexible Multilayer Board | | |
| Flexible High Speed Boards | | |
| Flexible High Frequency Boards | | |
| Flexible Microwave Boards | | |
| Rigid-Flex Hybrid Boards | | |
| Integrated Circuit Package Substrates | | |

B. How does this facility anticipate it's front-end engineering processing capabilities will change by 2020?

| End Use | Anticipated Change | Explain |
|---|---|---|
| Commercial | | |
| Defense | | |

C.

| | | |
|---|---|---|
| 1 | Does this facility have its own staff on site to perform front-end engineering for manufacturing bare circuit boards? | |
| 2 | Does this facility perform front-end engineering for manufacturing bare circuit boards as a service to other companies that may have bare circuit boards manufactured elsewhere? | |
| 3 | Does this facility outsource any front-end engineering for bare circuit board products manufactured at this facility? | |
| | If yes, does your company notify customers in advance that it outsources front-end engineering for manufacturing bare circuit boards? | |

If this facility outsources front-end engineering for bare circuit board products, indicate the country or countries (including the United States) to which this service is outsourced:

| End Use | -Yes/No- | Country 1 | Country 2 | Country 3 |
|---|---|---|---|---|
| Commercial | | | | |
| Defense | | | | |

D. Identify the three biggest factors causing production bottlenecks at this facility.

| | | | |
|---|---|---|---|
| 1 | | Explain: | |
| 2 | | Explain: | |
| 3 | | Explain: | |

| Comments: | |
|---|---|

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

**Section 6a: Materials & Equipment**

A. For each of the inputs below, state whether you have experienced sourcing problems and identify the principal manufacturers of each material that this facility uses in manufacturing bare circuit boards.

| Material | Total Number of Manufacturers Used | Sourcing Problems | | Manufacturers | | |
|---|---|---|---|---|---|---|
| | | Availability is a Concern | Experienced Supply Chain Disruptions Since 2012 | | Two Principal Manufacturer Names | Country of Manufacture |
| Laminate for use in rigid conventional boards | | | | 1 | | |
| | | | | 2 | | |
| Laminate for use in rigid multilayer boards | | | | 1 | | |
| | | | | 2 | | |
| Laminate for use in rigid high speed, high frequency, and microwave boards | | | | 1 | | |
| | | | | 2 | | |
| Laminate for use in flex boards | | | | 1 | | |
| | | | | 2 | | |
| Laminate for use in rigid-flex boards | | | | 1 | | |
| | | | | 2 | | |
| Copper foil | | | | 1 | | |
| | | | | 2 | | |
| Other foils | | | | 1 | | |
| | | | | 2 | | |
| Embedded passives, formed, resistors, and capacitors (active or passive) - tin-lead | | | | 1 | | |
| | | | | 2 | | |
| Embedded passives, formed, resistors, and capacitors (active or passive) - lead free | | | | 1 | | |
| | | | | 2 | | |
| Through-hole and via preparation for plating material | | | | 1 | | |
| | | | | 2 | | |
| Electrolytic plating material | | | | 1 | | |
| | | | | 2 | | |
| Via fill, conductive, and non-conductive material | | | | 1 | | |
| | | | | 2 | | |
| Solder mask | | | | 1 | | |
| | | | | 2 | | |
| Finish materials | | | | 1 | | |
| | | | | 2 | | |
| Solder | | | | 1 | | |
| | | | | 2 | | |
| Etchant | | | | 1 | | |
| | | | | 2 | | |
| Drill bits | | | | 1 | | |
| | | | | 2 | | |
| Other (specify here) | | | | 1 | | |
| | | | | 2 | | |

Comments:

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

**Section 6b: Materials & Equipment (continued)**

| | | | |
|---|---|---|---|
| A. | 1 | If this facility were no longer able to purchase circuit board laminate from your current suppliers, for how many weeks could you continue normal operations? | |
| | 2 | How many weeks would it take this facility to obtain material from a new supplier of laminate? | |
| | 3 | Does the reduction in the number of companies in the U.S. that manufacture circuit board laminates and other circuit board-related materials create material supply problems for this facility? | |
| | | Explain: | |
| | 4 | How confident is this facility that it would be able to obtain on a timely basis the material necessary to rapidly ramp up bare circuit board production in the event of a national emergency? | |
| | | Explain: | |
| B. | | Which statement best describes this facility's general method for maintaining inventory levels of laminate and related materials required for the production of circuit boards? | |
| | | Explain: | |
| C. | | Does this facility use either of the following practices for assuring the availability of circuit board-related materials? | |
| | 1 | On-site stocking agreements through which distributors keep a quantity of materials at this facility. | |
| | 2 | Local stocking agreements through which distributors maintain supply warehouses in close proximity to this facility. | |
| | | Explain: | |
| | | Comments: | |

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

**Section 6c: Materials & Equipment (continued)**

From the list below identify how many of each type of equipment this facility has. Then, estimate its average age, and indicate your primary concern about continued/future use of this equipment

A.

| Equipment | Number of Functioning Units On Site | Estimated Average Age (in years) | Primary Concern | Explain |
|---|---|---|---|---|
| Photo film processing | | | | |
| Photo resist application | | | | |
| Photo resist exposure | | | | |
| Photo resist exposure-laser | | | | |
| Photo resist exposure-LED | | | | |
| Develop etch & strip equipment | | | | |
| Automatic optical inspection | | | | |
| Inner layer treatment & layup | | | | |
| Lamination | | | | |
| Drilling - mechanical | | | | |
| Drilling - laser | | | | |
| Desmear | | | | |
| Electroless copper | | | | |
| Electrolytic copper | | | | |
| Chemical cleaning | | | | |
| Solder mask | | | | |
| Final finish | | | | |
| Legend print | | | | |
| Routing | | | | |
| Electrical testing | | | | |
| Quality control measurement | | | | |
| Via fill | | | | |
| Scoring | | | | |
| Other (specify here) | | | | |
| Other (specify here) | | | | |
| Other (specify here) | | | | |

B.

| | U.S. | Non-U.S. | Explanation |
|---|---|---|---|
| Has this facility had trouble obtaining parts for U.S. or non-U.S. equipment? | | | |
| Has this facility had trouble obtaining service on U.S. or non-U.S. equipment? | | | |

C.

| | | | |
|---|---|---|---|
| Are there bare circuit board products that this facility is unable to manufacture due to the limitations of installed equipment? | | Explain: | |
| Have you had or do you anticipate having difficulty obtaining new equipment for manufacturing tin-lead bare circuit boards? | | Explain: | |

| Comments: | |
|---|---|

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

**Section 6d: Materials & Equipment (continued)**

| | | | | | |
|---|---|---|---|---|---|
| | Between 2012 and 2015 did this facility encounter product failures that are suspected or confirmed to be attributed to counterfeit materials used in building bare circuit boards? | | | | |
| A. | If so, identify the types of circuit board materials that were suspected or confirmed to be counterfeit products and explain the impact of the counterfeit. | | | | |
| | Prepreg | | | Explain: | |
| | Laminate | | | Explain: | |
| | Soldermask | | | Explain: | |
| | Other | (specify here) | | Explain: | |
| | Does this facility buy materials for the manufacture of bare circuit boards from sources other than the original manufacturer or its authorized distributor? | | | | |
| B. | If so, what practices do you regularly use to verify that the materials are genuine and perform to specifications? | | | | |
| | Systematic testing of inventory | | | | |
| | Confirm production lots and production dates with the original manufacturer | | | | |
| | Check authenticity of standards organization certification labels/trademarks | | | | |
| | Other | (specify here) | | | |
| | Other | (specify here) | | | |

| | |
|---|---|
| Comments: | |

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

**Section 7: Sales**

Provide this facility's sales information for the 2012-2015 to U.S. and non-U.S. customers.

Note: "U.S." means U.S. domestic sales; "Non-U.S." means export sales from U.S. locations.
Government sales include both direct and indirect sales to government customers. All sales with government end uses should be reported as government sales.

| | |
|---|---|
| Source of Sales Data: | |
| Reporting Schedule: | |

**Record in $ Thousands, e.g. $12,000.00 = survey input $12**

| | | 2012 | | 2013 | | 2014 | | 2015 | |
|---|---|---|---|---|---|---|---|---|---|
| | | U.S. | Non-U.S. | U.S. | Non-U.S. | U.S. | Non-U.S. | U.S. | Non-U.S. |
| A. | Total Sales (in $) | | | | | | | | |
| | Total Government Sales [as a % of line A] | | | | | | | | |
| B | All Circuit Board-Related Sales - including design, manufacture, and assembly (in $) | | | | | | | | |
| | All Circuit Board-Related Government Sales [as a % of line B] | | | | | | | | |
| B | Bare Circuit Board Manufacturing Sales - excluding design and assembly (in $) | | | | | | | | |
| | Bare Circuit Board Government Sales [as a % of line C] | | | | | | | | |

| | |
|---|---|
| Comments: | |

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

## Section 8: Financials

Provide the following financial line items for your facility/organization below.

Note: Facility level data is preferred. If you do not keep this information at a location level, provide data at the closest level available.

| | | | | | |
|---|---|---|---|---|---|
| Source of Income Statement Items: | | | | | |
| Reporting Schedule: | | | | | |
| Income Statement (Select Line Items) | | Record $ in Thousands, e.g. $12,000.00 = survey input of $12 | | | |
| | | 2012 | 2013 | 2014 | 2015 |
| A. | Net Sales (and other revenue) | | | | |
| B. | Cost of Goods Sold | | | | |
| C. | Total Operating Income (Loss) | | | | |
| D. | Earnings Before Interest and Taxes | | | | |
| E. | Net Income | | | | |
| Source of Balance Sheet Items: | | | | | |
| Reporting Schedule: | | | | | |
| Balance Sheet (Select Line Items) | | Record $ in Thousands, e.g. $12,000.00 = survey input of $12 | | | |
| | | 2012 | 2013 | 2014 | 2015 |
| A. | Cash | | | | |
| B. | Inventories | | | | |
| C. | Total Current Assets | | | | |
| D. | Total Assets | | | | |
| E. | Total Current Liabilities | | | | |
| F. | Total Liabilities | | | | |
| G. | Retained Earnings | | | | |
| H. | Total Owner's Equity | | | | |

Note: Total Assets must equal Total Liabilities plus Total Owner's Equity

| Comments: | |
|---|---|

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

## Section 9a: Research & Development

| | | | |
|---|---|---|---|
| A. | Does this facility/organization conduct research and development (R&D)? | | If No, proceed to Section 10. |

In Question B, record this facility's total dollar R&D expenditure and type of R&D expenditure for each of the years 2012 to 2015.
In Question C, identify this facility's R&D funding sources, by percent of total R&D dollars sourced.

Note: Facility level data is preferred. If you do not keep this information at a facility level, provide data at the closest level available.

| | |
|---|---|
| Source of R&D Data: | |
| Reporting Schedule: | |

B.

| | | Record $ in Thousands, e.g. $12,000.00 = survey input of $12 | | | |
|---|---|---|---|---|---|
| | | 2012 | 2013 | 2014 | 2015 |
| 1 | Total R&D Expenditures | | | | |
| 2 | Basic Research (as a percent of B1) | | | | |
| 3 | Applied Research (as a percent of B1) | | | | |
| 4 | Product/Process Development (as a percent of B1) | | | | |
| 5 | Total of 2 - 4 (must equal 100%) | 0% | 0% | 0% | 0% |
| 6 | Bare Circuit Board R&D Expenditures (as a percent of B1) | | | | |
| 7 | Defense-Related Bare Circuit Board R&D Expenditures (as a percent of B1) | | | | |

C.

| | | Record $ in Thousands, e.g. $12,000.00 = survey input of $12 | | | |
|---|---|---|---|---|---|
| | | 2012 | 2013 | 2014 | 2015 |
| 1 | Total R&D Funding Sources | | | | |
| 2 | Internal/Self-Funded/IRAD (as a percent of C1) | | | | |
| 3 | Total Federal Government (as a percent of C1) | | | | |
| 4 | Total State and Local Government (as a percent of C1) | | | | |
| 5 | Universities - Public and Private (as a percent of C1) | | | | |
| 6 | U.S. Industry, Venture Capital, Non-Profit (as a percent of C1) | | | | |
| 7 | Non-U.S. Investors (as a percent of C1) | | | | |
| 8 | Other (specify here) | | | | |

| | |
|---|---|
| Comments: | |

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

**Section 9b: Research & Development (continued)**

A. Identify this facility/organization's anticipated top R&D priorities over the next five years and provide a brief explanation.

| | Priority | Description |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |

B. Identify the key factors driving this facility's investment in research and development and explain how these factors shape this facility's research and development projects.

| Factor | | -Yes/No- | Explain |
|---|---|---|---|
| Need for competitive advantage | | | |
| Customer requirements | | | |
| Industry roadmap | | | |
| Other | (specify here) | | |
| Other | (specify here) | | |
| Other | (specify here) | | |

C. From 2012-2015, were your organization's R&D expenditures adversely impacted by reductions in U.S. Government defense spending?

Explain:

D. Are there specific R&D areas related to bare circuit board manufacturing that DOD could support to improve board performance?

Explain:

E. What advanced bare circuit board-related technologies should DOD support in order to better enable manufacturers to meet future national security requirements?

| | | | |
|---|---|---|---|
| 1 | | Explain: | |
| 2 | | Explain: | |
| 3 | | Explain: | |

Comments:

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

## Section 10: Capital Expenditures

Record this facility's capital expenditures corresponding to the select categories below.

Note: Facility level data is preferred. If you do not keep this information at a location level, provide data at the closest level available.

| | |
|---|---|
| Source of Capital Expenditure Data: | |
| Capital Expenditure Reporting Schedule: | |

| | Capital Expenditure Category | Record $ in Thousands, e.g. $12,000.00 = survey input of $12 | | | |
|---|---|---|---|---|---|
| | | 2012 | 2013 | 2014 | 2015 |
| A | Total Capital Expenditures | | | | |
| 1 | Machinery, Equipment, and Vehicles [as a % of A] | | | | |
| 2 | IT, Computers, Software [as a % of A] | | | | |
| 3 | Land, Buildings, and Leasehold Improvements [as a % of A] | | | | |
| 4 | Other (specify) | | | | |
| 5 | Other (specify) | | | | |
| | Lines 1 through 5 must total 100% | 0% | 0% | 0% | 0% |
| 6 | Bare circuit board-related capital expenditures [as a % of A] | | | | |

| | | |
|---|---|---|
| B | From 2012-2015, were your organization's bare circuit board-related capital expenditures adversely impacted by reductions in U.S. Government defense spending? | |
| | Explain: | |

C Identify your facility/organization's anticipated top bare circuit board-related capital expenditure priorities over the next five years and provide a brief explanation.

| | Priority | Description |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |

| | |
|---|---|
| Comments: | |

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

## Section 11a: Workforce

Record the total number of full time equivalent (FTE) employees in your U.S.-based operations for the 2012-2015 period. Then, estimate the percentage of these employees that perform the occupations indicated in part A, lines a-i

Note: Facility level data is preferred. If you do not keep this information at a location level, provide data at the closest level available.

| | |
|---|---|
| Source of Workforce Data: | |
| Reporting Schedule: | |

**A**

| | | | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|
| 1 | Circuit Board-Related Full Time Equivalent (FTE) Employees | | | | | |
| a | Administrative, Management, & Legal Staff [as a % of line 1] | | | | | |
| b | Engineers, Scientists, and R&D Staff [as a % of line 1] | | | | | |
| c | Facility & Maintenance Staff [as a % of line 1] | | | | | |
| d | Information Technology Professionals [as a % of line 1] | | | | | |
| e | Marketing & Sales [as a % of line 1] | | | | | |
| f | Production Line Workers [as a % of line 1] | | | | | |
| g | Testing Operators, Quality Control, and Support Technicians [as a % of line 1] | | | | | |
| h | Other | (specify here) | | | | |
| i | Other | (specify here) | | | | |
| **Lines a through i must total 100%** | | | **0%** | **0%** | **0%** | **0%** |

**B**

Does this facility have difficulty hiring and/or retaining any types of employees?
If yes, identify which occupations, type of difficulty, and provide an explanation.

| Occupation | Difficulty | Explanation |
|---|---|---|
| Chemist | | |
| Chemical Engineer | | |
| Electrical Engineer | | |
| Mechanical Engineer | | |
| Industrial Engineer | | |
| Safety Engineer | | |
| Graphic Arts Engineer | | |
| Process Engineer | | |
| Product Engineer | | |
| CAM Software - Job Tooling Tech | | |
| Imaging Tech | | |
| Silk Screening Tech | | |
| Plating Tech | | |
| Electrical Testing Tech | | |
| Mechanical Drilling Tech | | |
| Laser Drilling Tech | | |
| Testing Tech | | |
| Other (specify here) | | |

**C**

Identify the key workforce issues you anticipate in the next five years.

| Issue | -Yes/No- | Explanation |
|---|---|---|
| Finding U.S. citizens | | |
| Finding qualified workers | | |
| Finding experienced workers | | |
| Finding workers able to get security clearances | | |
| Attracting workers to location | | |
| Significant portion of workforce retiring | | |
| Employee turnover | | |
| Other (specify here) | | |
| Other (specify here) | | |

| | |
|---|---|
| Comments: | |

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

**Section 11b: Workforce (continued)**

| | | | |
|---|---|---|---|
| A. | What percentage of this facility's technical staff do you expect to retire within the next five years? | | |
| | What percentage of this facility's technical staff do you expect to have to replace over the next five years? | | |
| | Explain: | | |

First, estimate the total number of employees you have with each level of work experience and estimate the percentage that are U.S. citizens.

Then, for each technical role, estimate the number of employees you have with each level of work experience.

| | | Applicable Working Experience | | | |
|---|---|---|---|---|---|
| | | Over 20 Years | 11-20 Years | 6-10 Years | Five or Fewer Years |
| All Employees | # of Employees | | | | |
| | % U.S. Citizens | | | | |

Note: Double counting is permitted for this section. For example, if an employee serves as both a mechanical drilling tech and a laser drilling tech, she would be included in both lines.

| B | | # of Employees | # of Employees | # of Employees | # of Employees |
|---|---|---|---|---|---|
| | Chemist | | | | |
| | Chemical Engineer | | | | |
| | Electrical Engineer | | | | |
| | Mechanical Engineer | | | | |
| | Industrial Engineer | | | | |
| | Safety Engineer | | | | |
| | Graphic Arts Engineer | | | | |
| | Process Engineer | | | | |
| | Product Engineer | | | | |
| | CAM Software - Job Tooling Tech | | | | |
| | Imaging Tech | | | | |
| | Silk Screening Tech | | | | |
| | Plating Tech | | | | |
| | Electrical Testing Tech | | | | |
| | Mechanical Drilling Tech | | | | |
| | Laser Drilling Tech | | | | |
| | Testing Tech | | | | |
| | Other (specify here) | | | | |

| | |
|---|---|
| Comments: | |

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

## Section 12a: Competitive Factors

| | | | |
|---|---|---|---|
| A. | What is the primary, if any, significant change in operations that is expected at this facility in the next five years? | | |
| | Explain: | | |
| B. | 1 Have recent changes in environmental control regulations adversely affected this facility's capability to compete against circuit board manufacturers in other countries? | | |
| | Explain: | | |
| | 2 Will environmental regulations force this facility to cease manufacturing tin-lead circuit boards? | | |
| | If yes, what year is this facility expected to cease producing tin-lead circuit boards? | Comments: | |
| | 3 Do environmental regulations cause this facility to keep smaller quantities of circuit board manufacturing materials in inventory than what you might otherwise consider optimal? | | |
| | Explain: | | |

C. Indicate whether the following factors affect this facility's interest in USG business.

| Factor | Reduce Interest in USG Business | May Cause Facility to Stop Producing for USG | Explain |
|---|---|---|---|
| Paperwork/Requirements | | | |
| Slow Payment | | | |
| Small Production Lots | | | |
| Insufficient Profit Margin | | | |
| Infrequent Orders | | | |
| Intellectual Property Protection | | | |
| One-off orders | | | |
| Other (specify here) | | | |

D. Indicate how DOD requirements to use MIL-PRF-31032 standards affect your costs relative to other existing standards?

| | Estimated Change Relative to MIL-P-50884C | Estimated Change Relative to IPC-6012 Class 3 | Explain |
|---|---|---|---|
| Direct change in fixed costs per slash sheet | | | |
| Change in recurring costs for maintenance | | | |
| Added administrative cost of compliance | | | |

Comments:

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

**Section 12b: Competitive Factors (continued)**

A.

| | |
|---|---|
| To what extent is this facility's continued ability to manufacture bare circuit boards for USG customers dependent on the viability of your commercial circuit board business? | |
| Explain | |
| To what extent is this facility's continued ability to manufacture bare circuit boards for commercial customers dependent on the viability of your USG business? | |
| Explain | |
| Is the return-on-investment (ROI) associated with this facility's DEFENSE-RELATED bare circuit board manufacturing business sufficient relative to capital requirements and business risk? | |
| Is the return-on-investment (ROI) associated with this facility's COMMERCIAL bare circuit board manufacturing business sufficient relative to capital requirements and business risk? | |
| Explain | |

B.

| | | |
|---|---|---|
| What level of overall industry consolidation do you expect to occur in the U.S. bare circuit board industry in the next five years? | | |
| What two key factors do you see driving such a consolidation? | | |
| Explain: | | |
| What level of foreign acquisition of U.S. bare circuit board manufacturers do you expect in the next five years? | | |
| Explain: | | |

C. Which of the following impacts do you anticipate from consolidation in the number of U.S. bare circuit board manufacturing facilities?

| Impact | -Yes/No- | Explain |
|---|---|---|
| Fewer U.S. materials manufacturers | | |
| Greater dependence on non-U.S. materials | | |
| Higher material costs | | |
| Pricing advantage for larger board manufacturers | | |
| Small companies less able to compete | | |
| Reduced domestic board capability | | |
| Shrinkage in manufacturing workforce | | |
| Increased market share for non-U.S. companies | | |
| Higher prices for bare board customers | | |
| Other | | |
| Other | | |

| | |
|---|---|
| Comments: | |

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

**Section 12c: Competitive Factors (continued)**

A. What impact would each of the following potential USG actions have on your business?

| Action | | Expected Impact on Organization | Explanation |
|---|---|---|---|
| Increased funding of targeted bare circuit board manufacturing technology R&D | | | |
| DOD requirement that electronic systems (not ITAR controlled) use circuit boards made in manufacturing facilities located in the U.S. | | | |
| DOD adds circuit board laminate and related materials to the Defense National Stockpile | | | |
| USG requirement that circuit boards produced for critical systems be manufactured with laminate and related materials made in the U.S. | | | |
| DOD requirement for designated types of defense systems to use bare circuit boards manufactured in the U.S. by certified "trusted" suppliers | | | |
| DOD requirement that bare circuit board manufacturers of products for designated defense systems be registered on the Qualified Manufacturers List (QML) and/or Qualified Products List (QPL) | | | |
| Other | (specify here) | | |
| Other | (specify here) | | |

| Comments: | |
|---|---|

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

## Section 13a: Cyber Security

| | | |
|---|---|---|
| A. | Does your organization's internal network connect to the Internet? | Internal Network (drop-down) |
| B. | Indicate who is responsible for your organization's internal IT networks: | |
| | Indicate who is responsible for your organization's external IT networks: | |

C. Does this facility have defined, structured methods for actively protecting the following types of Commercially Sensitive Information (see definitions)?

| Commercially Sensitive Information (CSI) Type | -Yes/No- | Explanation |
|---|---|---|
| Customer/client information | | |
| Financial information and records | | |
| Human resources information/employee data | | |
| Information subject to export control regulations (EAR and/or ITAR) | | |
| Intellectual property related information | | |
| Internal communications including negotiation points, merger and acquisition plans, and/or corporate strategy | | |
| Manufacturing and production line information | | |
| Patent and trademark information | | |
| Regulatory/compliance information | | |
| Research and development (R&D) related information | | |
| Supply chain and sourcing information | | |

| | |
|---|---|
| Comments: | |

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page | Return to Table of Contents | Next Page

**Section 13b: Cyber Security (continued)**

| | | | |
|---|---|---|---|
| A. | Have recent cyber incidents across the marketplace caused your organization to increase its information security budget? | | |
| B. | Estimate the percentage of your organization's commercially sensitive information that is stored with: | External Cloud Service Providers | |
| | | External Data Storage Providers | |
| | Does your organization restrict or prohibit your external cloud service or external data storage provider(s) from storing commercially sensitive information outside of the U.S.? | | |

C. Indicate the level of impact each of the following types of events attributed to malicious cyber activity has had on this facility since 2012.

| Event | | Impact Level | Explanation |
|---|---|---|---|
| User idle time and lost productivity because of downtime or systems performance delays | | | |
| Disruption to normal operations because of system availability problems | | | |
| Damage or theft of IT assets and infrastructure | | | |
| Incurred cost of damage assessment and remediation | | | |
| Business interruption | | | |
| Exfiltration of CSI data | | | |
| Theft of personnel information | | | |
| Damage to software and/or source code | | | |
| Theft of software and/or source code | | | |
| Damage to company production capabilities or systems | | | |
| Destruction of information asset | | | |
| Reputation loss, market share, and brand damages | | | |
| Other | (specify here) | | |
| Other | (specify here) | | |
| Other | (specify here) | | |

Note: The FBI encourages recipients to report information concerning suspicious or criminal activity to their local FBI field office or the FBI's 24/7 Cyber Watch (CyWatch). Field office contacts can be identified at http://www.fbi.gov/contact-us/field. CyWatch can be contacted by phone at 855-292-3937 or e-mail at CyWatch@ic.fbi.gov. When available, each report submitted should include the date, time, location, type of activity, number of people, and type of equipment used for the activity, the name of the submitting company or organization, and a designated point of contact.

| | |
|---|---|
| Comments: | |

Previous Page | Return to Table of Contents | Next Page

## Section 14: Challenges and Outreach

A.

Identify the issues that have or are expected to impact this facility.
In column A, identify all issues that currently are affecting your business in an adverse way or that are expected to do so in the future.
In column B, rank your top five issues (one being the most important) by selecting numbers one through five, using each rank exactly once.
In column C, provide an explanation for the relevant issues.

| Type of Issue | A Impact | B Rank Top 5 | C Explanation |
|---|---|---|---|
| Aging equipment, facilities, or infrastructure | | | |
| Aging workforce | | | |
| Competition - domestic | | | |
| Competition - foreign | | | |
| Counterfeit parts | | | |
| Cyber security | | | |
| Environmental regulations/remediation - domestic | | | |
| Environmental regulations/remediation - foreign | | | |
| Export controls/ITAR & EAR | | | |
| Government acquisition process | | | |
| Government purchasing volatility | | | |
| Government regulatory burden | | | |
| Healthcare costs | | | |
| Health and safety regulations | | | |
| Intellectual property/patent infringement | | | |
| Labor availability/costs | | | |
| Material input availability | | | |
| Obsolescence | | | |
| Pension costs | | | |
| Proximity to customers | | | |
| Proximity to suppliers | | | |
| Qualifications/certifications | | | |
| Quality of material inputs | | | |
| R&D costs | | | |
| Reduction in commercial demand | | | |
| Reduction in USG demand | | | |
| Taxes | | | |
| Worker/skills retention | | | |
| Other (specify here) | | | |

B.

There are many federal and state government programs and services available to assist your organization to better compete in the global marketplace. If your organization would like more information regarding these government programs, select the specific areas of interest below. The Commerce Department will follow-up with your organization regarding your selections.

| | | | |
|---|---|---|---|
| Continuous Improvement/ Lean Manufacturing | | Market Expansion/Business Growth | |
| Cyber Security | | Product Design | |
| Design for Assembly | | Prototyping | |
| Design for Manufacturability | | Quality Management and Control | |
| Energy and Environmentally Conscious Manufacturing | | Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) contracts | |
| Export Assistance | | Supply Chain Optimization | |
| Export Licensing (ITAR/EAR) | | Technology Acceleration | |
| Government Procurement Guidelines | | Vendor/Material Sourcing | |
| Other (specify here) | | Other (specify here) | |

Comments:

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**

Previous Page Return to Table of Contents

## Section 15: Certification

The undersigned certifies that the information herein supplied in response to this questionnaire is complete and correct to the best of his/her knowledge. It is a criminal offense to willfully make a false statement or representation to any department or agency of the United States Government as to any matter within its jurisdiction (18 U.S.C.A. 1001 (1984 & SUPP. 1197))

Once this survey is complete, submit it via e-mail to: printedcircuitboards@bis.doc.gov. Be sure to retain a copy for your records and to facilitate any necessary edits or clarifications.

| | |
|---|---|
| Facility Name | |
| Organization Name | |
| Organization's Internet Address | |
| Name of Authorizing Official | |
| Title of Authorizing Official | |
| E-mail Address | |
| Phone Number and Extension | |
| Date Certified | |

In the box below, provide any additional comments or any other information you wish to include regarding this survey assessment.

| | |
|---|---|
| How many hours did it take to complete this survey? | |

**BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act**