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OMB Control Number: 0694-0119
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 Information furnished herewith is deemed confidential and will not be published or disclosed except in accordance with Section 705 of the Defense Production Act of 1950, as amended (50 U.S.C App.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.

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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. 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. **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. 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: printedcircuitboards@bis.doc.gov. (E-mail is the preferred method of contact). 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: Brad Botwin, Director, Industrial Studies Office of Technology Evaluation, Room 1093 U.S. Department of Commerce 1401 Constitution Avenue, NW Washington, DC 20230 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.

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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.

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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.

1. Organization has a single facility in the U.S.
2. Organization has multiple facilities, but only one bare circuit board manufacturing facility in the U.S.
3. Organization has multiple facilities in the U.S. with bare circuit board manufacturing capabilities.

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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:	

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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:	

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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

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

B.	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

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

C.	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:	

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

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.

A.

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

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.):

B.

	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:

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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:

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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:

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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:

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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:	

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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:

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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:	

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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:

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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:

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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?	

3 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:	

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Section 6a: Materials & Equipment

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.

A.

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:

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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:	

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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:	

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Section 6d: Materials & Equipment (continued)

A.	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?				
	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:	
B.	Does this facility buy materials for the manufacture of bare circuit boards from sources other than the original manufacturer or its authorized distributor?				
	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:	

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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:

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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:	

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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:

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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:

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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:	

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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:	

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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:	

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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:	

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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:

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Section 12c: Competitive Factors (continued)

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

	Action		Expected Impact on Organization	Explanation
A.	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:	

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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:	

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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:	

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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:

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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?	

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