

DEFENSE INDUSTRIAL BASE ASSESSMENT: THE U.S. INTEGRATED CIRCUIT DESIGN AND MANUFACTURING INDUSTRY**SCOPE OF ASSESSMENT**

The U.S. Department of Commerce, Bureau of Industry and Security (BIS), Office of Technology Evaluation (OTE), is conducting a survey and assessment of the health and competitiveness of the U.S. design and manufacturing infrastructure available for producing Integrated Circuit products required for meeting U.S. national security needs. The goal of this study is to provide decision makers in the U.S. Departments of Defense, Energy, Justice, Homeland Security, and other Executive Branch agencies with detailed information on (1) the health and status of Integrated Circuit design and manufacturing capabilities remaining in the United States; and (2) the outlook for maintaining these activities in the future. The scope of this effort encompasses Integrated Circuit design and manufacturing resources, including the supply chain.

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 Information furnished herewith is deemed confidential and will not be published or disclosed except in accordance with Section 705 of the Defense Production Act of 1950, as amended (50 U.S.C App.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

Notwithstanding 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 14 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. TKTK-TKTK), Washington, D.C. 20503.

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[Previous Page](#)[Return to Table of Contents](#)[Next Page](#)**Section I: General Instructions**

A.	<p>Your organization is required to complete this survey of the U.S. Integrated Circuit industry using an Excel template, which can be downloaded from the BIS website: http://bis.doc.gov/chipsurvey</p> <p>If you are not able to download the survey document, at your request BIS, staff will e-mail the Excel survey template directly to you.</p> <p>For your convenience, a PDF version 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 organization will be required to resubmit the survey in the requested Excel format.</p>
B.	<p>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.</p> <p>DO NOT CUT AND PASTE RESPONSES WITHIN THIS SURVEY.</p> <p>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.</p>
C.	<p>Do not disclose any classified information in this survey form.</p>
D.	<p>Estimates are sometimes acceptable where indicated, but in sections that do not explicitly allow estimates you must contact BIS survey support staff before including estimates.</p>
E.	<p>Upon completion of the survey, final review, and certification, transmit the survey document via e-mail to: chipstudy@bis.doc.gov</p>
F.	<p>Questions related to the survey should be directed to BIS survey support staff at chipstudy@bis.doc.gov (E-mail is the preferred method of contact).</p> <p>You may also speak with a member of the BIS survey support staff by calling (202) 482-6339</p>
G.	<p>For questions related to the overall scope of this Industrial Base assessment, contact:</p> <p>Brad Botwin, Director, Industrial Studies Office of Technology Evaluation, Room 1093 U.S. Department of Commerce 1401 Constitution Avenue, NW Washington, DC 20230</p> <p>DO NOT submit completed surveys to Mr. Botwin's postal or e-mail address; all surveys must be submitted electronically to XXX</p>

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.
Basic Research	Systematic, scientific study directed toward greater knowledge or understanding of the fundamental aspects of phenomena and of observable facts.
Capability	The ability to perform defined design and/or manufacturing steps for producing integrated circuit products within an organization's own facilities and with its own employees with little or no outsourcing.
Capital Expenditures	Investments made by an organization in buildings, equipment, property, and systems where the expense is depreciated. This does not include expenditures for consumable materials, other operating expenses and salaries associated with normal business operations.
Commercial and Government Entity (CAGE) Code	Commercial and Government Entity (CAGE) Code identifies companies doing or seeking 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 https://cage.dla.mil/search/ .
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 information's owners.
Customer	An entity to which an organization directly delivers the product or service that the facility produces. A customer may be another organization or another facility owned by the same parent organization. The customer may be the end user for the item but often will be an intermediate link in the supply chain, adding additional value before transferring the item to yet another customer.
Cyber Security	The body of technologies, processes, and practices designed to protect networks, computers, programs, and data from attack, damage, or unauthorized access.
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 .
Development	The design, development, simulation, or experimental testing of prototype or experimental hardware or systems, to validate technological feasibility or concept of operation, to reduce technological risk, or to provide test systems prior to production approval.
Design	Design activity required to implement a product concept in support of the manufacture of the Integrated Circuit product at a fabrication facility.
Facility	A facility can constitute a single building or multiple buildings functioning as a unified design, fabrication, or packaging facility. Design, fabrication, and packing, test and assembly operations must be identified separately. Individual wafer fabrication facilities serving distinct sets of technology nodes should be identified separately even if operating on a single campus.
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.
Harmonized Tariff Schedule (HTS)	The Harmonized Tariff Schedule (HTS) is the statute used to determine tariff classifications for goods imported in the United States and maintained and published by the United States International Trade Commission. The HTS is based on the International Harmonized System.
Integrated Circuit	Analog or digital devices that incorporate transistors, diodes, capacitors, resistors, and other circuit elements that are integrated on a single substrate (chip), typically silicon.
Location	For the purpose of this survey, a location is a single contiguous site.
Manufacturing	The production of a working Integrated Circuit product in a fabrication facility.
Neutron Hardened	Integrated Circuit products incorporating design features and/or physical characteristics that can withstand the damaging effects of high-speed neutrons, gamma rays, and electromagnetic pulses that accompany a nuclear weapons detonation. Most CMOS[1] technologies are inherently neutron hardened without any specific effort on the part of an ICs designer/manufacturer. For "minority carrier" IC devices that are affected by neutron-induced displacement damage, a level of 1X10 ¹⁴ n/cm ² (1MeV equivalent fluence) is the accepted standard.[2]
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
Organization	A company, firm, laboratory, or other entity that owns or controls one or more U.S. establishment capable of designing and/or manufacturing Integrated Circuit products. A company may be an individual proprietorship, partnership, joint venture, or corporation (including any subsidiary corporation in which more than 50 percent of the outstanding voting stock is owned by a business trust, cooperative, trustee(s) in bankruptcy, or receiver(s) under decree of any court owning or controlling one or more establishment.
Product/Process Development	Conceptualization and development of a product prior to the production of the product for customers.
Radiation Hardened	Integrated Circuit products incorporating design features and/or physical characteristics that demonstrate a capability to resist radiation-induced damage from industrial sources, electromagnetic pulses, weapons systems; and/or charged particles in space that can damage circuitry and render a device inoperable. Some IC devices may be considered radiation hardened when their total dose failure level exceeds >300 krad.[3] A total dose failure level of 500krad is the standard cited in International Traffic in Arms (ITAR) regulations.[4]

Radiation Tolerant	Integrated Circuit products incorporating design features and/or physical characteristics with limited capability to resist radiation induced damage from industrial sources, electromagnetic pulses, industrial sources, weapons systems, and charged particles in space that can damage circuitry and render a device inoperable. Radiation tolerant would cover parts having a total dose failure level >100 krad but less than 300 krad.
Research and Development	Basic and applied research in the engineering sciences, as well as design and development of prototype products and processes.
Semiconductor	Elemental materials such as silicon and germanium (or compounds like gallium arsenide) that possess levels of electrical conductivity that are less than a conductor but greater than an insulator. The properties of these materials and similar ones can be manipulated to affect conductivity through temperature and/or the use of dopants.
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-Event Effects Resistant	Single-event effects caused by a single energetic particle striking an Integrated Circuit (IC) device. Performance of the IC device is not compromised to a point where it is inoperable or not reliable for executing a mission as a result of latch-up, burnout, or gate rupture.
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.
Trusted Access Program	A program implemented by the National Security Agency and the Defense Microelectronics Activity (DMEA) to qualify Integrated Circuit design and manufacturing companies as "trusted" suppliers of application specific Integrated Circuit (ASIC) products required for national security applications.
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.
Wafer Starts Per Week	The number of semiconductor wafers that can be processed by an Integrated Circuit production line(s) in a 7-day period.
	[1] Complimentary metal oxide semiconductor (CMOS) is a class of semiconductor used in digital logic circuits employed in microcontrollers, microprocessors, memory, and other devices. The technology also is used in analog circuits in sensors, transceivers, data converters and other systems.
	[2] Sandia National Laboratories. A minority carrier device is a device in which current is conducted by charge carriers of sign (positive or negative) opposite to the dopant polarity of the underlying semiconductor material. In other words, current carried by electrons (negative) in a p-type semiconductor, or by holes in an n-type semiconductor. In semiconductors, minority charge carriers are less abundant than majority charge carriers. Minority carrier devices: Bipolar junction transistors, charge-coupled devices (CCDs), solar cells.
	[3] Sandia National Laboratories.
	[4] ITAR Part 121 – The United States Munitions List (See www.pmdtc.state.gov/consolidated_itar.htm). [Microelectronic circuits are considered radiation hardened when they exceed all five of these standards: (1) Total dose of 5x10 ⁵ Rads (Si); (2) Dose rate upset of 5x10 ⁸ Rads (Si) per second; (3) Neutron dose of 1x10 ¹⁴ N/cm ² ; (4) Single-Event upset of 1x10 ^{minus;7} or less error/bit/day; and (5) Single-Event latch-up free and having a dose rate latch-up of 5x10 ⁸ Rads (Si) per second or greater.]
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CORPORATE LEVEL RESPONSE

Section III: Organization Reporting Profile

This survey consists of sections that must be answered at the Corporate Level and other sections that must be answered at the Facility Level. The reporting level will be specified at the top of each section in **RED**. Facilities that will be responding separately from their corporate headquarters should proceed to section 1a to begin the survey.

Description of Business Activity

A.	Select the description of your organization's U.S. operations that most closely reflects its business:	
	Design Integrated Circuit products (fabless)	Yes/No
	Design and Manufacture Integrated Circuit products (integrated device manufacturer)	
	Design and Manufacture Integrated Circuit products; and perform Package, Test & Assembly	
	Manufacture Integrated Circuit products (as a foundry)	
	Manufacture Integrated Circuit products (as a foundry) and perform Package, Test & Assembly	
	Design Integrated Circuit products (fabless); and perform Package, Test & Assembly	
	Provide Package, Test & Assembly Services	
Other [Write In]		

B.	Identify the number of Integrated Circuit-related design and manufacturing facilities that your organization operated in the United States in 2016.	IC Activity	U.S. Locations	Non-U.S. Locations
		Design		
		Manufacturing		
	Packaging, Test & Assembly			
Comments:				

C.	Identify all of your organization's Integrated Circuit-related Design, Manufacturing, and Packaging facilities* located in the United States.				
	Facility* Name	City	State	DMEA Certified Trusted** Facility	Primary Scope of Work
				Yes	Design
				No	Manufacturing
					PT&A
					Other
	*Facilities can constitute a single building or multiple buildings functioning as a unified design, fabrication, or packaging facility. Design, fabrication, and packing, test and assembly operations must be identified separately. Individual wafer fabrication facilities serving distinct sets of technology nodes should be identified separately even if operating on a single campus.				
** "Trusted" refers to certification from the Defense Microelectronics Activity's Trusted Accreditation Program to design or manufacture Integrated Circuit products.					
Comments:					

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CORPORATE LEVEL RESPONSE

Section III: Reporting Level (Cont.)

A.	Is your organization publicly traded or privately held?			If your organization is publicly traded, identify its stock ticker symbol.			
B.	Provide the following identification codes, as applicable, for your organization.						
		Data Universal Numbering System (DUNS) Code(s)		Harmonized Tariff Schedule (HTS) Code(s)		NAICS (6-digit) Code(s)*	
		Find DUNS numbers at: http://fedgov.dnb.com/w ebform		Find HTS numbers at: http://hts.usitc.gov		Find NAICS codes at: http://www.census.gov/e pcd/www/naics.html	
C.	Indicate if your organization qualifies as any of the following types of business:						
	A small business enterprise (as defined by the Small Business Administration)						
	8(a) Firm (as defined by the Small Business Administration)						
	A historically underutilized business zone (HUB Zone)						
	A minority-owned business						
	A woman-owned business						
A veteran-owned or service-disabled veteran owned business							
D.	Specify the industry sectors that your organization serves through the provision of design and/or manufacturing services for Integrated Circuit products located in the United States:						
	Aviation systems/Avionics	Yes	Healthcare/Medical Devices				
	Automotive	No	Industrial				
	Consumer electronics	N/A	Military and Space				
	Communications		Other National Security systems				
	Electronic Data Processing		Optical/Photonics				
	Energy		Other [Write In]				
Comments:							

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FACILITY LEVEL RESPONSE

Section 1a: Organization Information

This survey consists of sections that must be answered at the Corporate Level and other sections that must be answered at the Facility Level. The reporting level will be specified at the top of each section as appropriate.

A.	Provide the following information for your facility.			
	Facility Name			
	Street Address			
	City			
	State			
	Zip Code			
	Website			
	Phone Number			
	CAGE Code (if applicable)			
B.	Select the option that most closely describes this facility's Primary Business, and indicate any "Additional Business Lines."	Primary Business	Integrated circuit/semiconductor product design facility	
			Integrated circuit/semiconductor product fabrication facility	
		Additional Business Line	Integrated circuit/semiconductor product packaging, assembly, and test facility	
			Integrated circuit/semiconductor product research and development facility	
		Additional Business Line	Integrated circuit/semiconductor product corporate headquarters facility	
		N/A		
C.	Provide the following information for your parent organization(s), if applicable. Enter N/A if no parent organization.			
		Parent Organization 1		Parent Organization 2
	Organization Name			
	Street Address			
	City			
	State/Province			
	Country			
Postal Code/Zip Code				
D.	Point of Contact regarding this survey:			
	Name	Title	Phone Number	E-mail Address
Comments:				

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FACILITY LEVEL RESPONSE

Section 2 Integrated Circuit Design & Manufacturing

2.a List this facility's Integrated Circuit Design and Manufacturing product capabilities and market types in the United States in calendar year 2016.

Design and Manufacturing Facility Market Types and Capabilities															
Product Capabilities	Conventional Integrated Circuit Products			Single-Event Effects Resistant			Radiation Tolerant			Radiation Hardened			Neutron Hardened		
Market Types	Commercial	Industrial	Military/Space	Commercial	Industrial	Military/Space	Commercial	Industrial	Military/Space	Commercial	Industrial	Military/Space	Commercial	Industrial	Military/Space
	Design/Manufacture/Both/Neither														

2.b Identify this facility's Integrated Circuit-related design and manufacturing capabilities by technology node, wafer size, and material type:

Capability to Design and/or Manufacture - by Technology Node, Wafer Size & Material Type															
<i>(Select all that apply -- A blank response is counted as "No Capability")</i>															
Minimum Technology Node Capability [nanometers]	- by Wafer Size	Amorphous Silicon	Bulk Silicon	Silicon on Insulator	Silicon Germanium	Silicon on Sapphire	Silicon Carbide	Aluminum Gallium Arsenide	Gallium Arsenide	Gallium Nitride	Indium Phosphide	Antimonides	Organic Technologies	Carbon Based Technologies (e.g., nanotubes)	Superconducting Materials
		7 - 10,000 <	2- or 3-inch	Design - Conventional											
4-inch	Design - Radiation Resistant														
6-inch	Manufacture - Conventional														
8-inch	Manufacture - Radiation Resistant														
12-inch	Both - Design														

Comments:

*Note: 10,000 nanometers equals 10 micrometers *Respond to this specification if your organization expects to develop a capability to work at this Technology Node by 2021.*

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CORPORATE LEVEL RESPONSE

Section 2 Integrated Circuit Design & Manufacturing - continued

2.c Specify your organization's design and manufacturing capabilities by device type with regard to the production of custom radiation-tolerant, radiation-hardened, and neutron hardened Integrated Circuit products located in the United States:

Device Type	Capability to Design and/or Manufacture - by Device & Material Type																			
	<i>(Select all that apply -- A blank response is counted as "No capability")</i>																			
	Conventional IC Products	Radiation Tolerant	Radiation Hardened	Neutron Hardened	Single-Event Effects Resistant - Destructive	Single-Event Effects Resistant - Non-Destructive	Amorphous Silicon	Bulk Silicon	Silicon on Insulator	Silicon Germanium	Silicon on Sapphire	Silicon Carbide	Aluminum Gallium Arsenide	Gallium Arsenide	Gallium Nitride	Indium Phosphate	Antimonides	Organic Technologies	Carbon Based Technologies (e.g., nanotubes)	Superconducting Materials
Analog/Linear Technologies	Design																			
Digital Logic Technologies	Manufacture																			
Digital Signal Processors	Both																			
Field Programmable Gate Arrays	Neither																			
One-time, Electrically Programmable Gate Arrays																				
Mask Programmable Gate Arrays																				
Structured ASICs [a.k.a. Structured Arrays; Platform ASICs]																				
Standard Cell ASICs [a.k.a. cell-based ASICs]																				
Custom ASICs																				
MMIC** Technologies																				
Mixed Signal Technologies																				
Processors																				
Nonvolatile Memory																				
3-D Nonvolatile Memory																				
SRAM																				
DRAM - DDR3																				
DRAM - DDR4																				
IR*-Focal Plane Arrays																				
Anti-Tamper Technology																				
Display Electronics																				
MEMS Technologies																				
Optical/Photonic Technologies																				
RF Technologies																				
Other: [Write In]																				
Comments:																				

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FACILITY LEVEL RESPONSE

Section 2 Integrated Circuit Design & Manufacturing - Continued

2.d Identify this facility's design and manufacturing capabilities with regard to the production of Nonvolatile Memory devices, memory density, and access time:

Note: Do not complete this page if your organization does not design Nonvolatile Memory products. Proceed to Section 3

Memory Device Type (Stand-Alone)	Capability to Design Nonvolatile Memory - by Device, Density, Read-Write Speed																		
	Memory Density									Access Time [Nano Seconds (ns)]								Write/Erase	
	Select all that apply - A blank response is counted as "No capability"									Select all that apply - A blank response is counted as "No capability"								[Provide specifications]	
	<1 Mbit	1- <8 Mbit	16- <32 Mbit	64- <128 Mbit	256 - <1024 Mbit	1- <8 Gbit	16 - <32 Gbit	64 - <128 Gbit	> 128 Gbit	100-300ps ****	300 - <700ps	700ps - <1ns	1-<10ns	10-<20ns	20-<50ns	50-<150ns	>150ns	Size <small>Specify data size: Word, page, block, etc.</small>	Time <small>(Write in Spec.)</small>
Erasable Programmable Read-Only Memory (EPROM)	Design																	Write In	Write In
Electrically Erasable Programmable Read-Only Memory (EEPROM)	Manufacture																		
Flash - NOR*	Both																		
Flash - NAND	Neither																		
Flash - NAND 3D**																			
Ferro Electric (FeRAM)																			
Magnetoresistive (MRAM)																			
MEMS-base (nanotube, NRAM)																			
Memristor***																			
Phase Change Memory (PCM, a.k.a. PRAM)																			
Polymer																			
Storage Class Memory (e.g., RRAM)																			
Super Permanent Memory (XPM)																			
Zero Capacitor (ZRAM)																			
Other [Write In]																			
Other [Write In]																			

*NOR Flash memory is able to read individual flash memory cells, and as such it behaves like a traditional read-only memory (ROM).
 **Nonvolatile random access memory that can be erased electronically and rewritten up to 100,000 times.
 *** A non-volatile memory technology that can change its resistance in varying levels. It can offer resistance in two states for a digital 0 or 1 or to levels in between to go beyond a binary system.
 **** Pico second = 1 trillionth of a second.

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Section 3 Rad Tolerant, Rad Hardened, Neutron Hardened IC Design & Manufacturing														
3.a Identify your organization's current capabilities, previous capabilities and interest in developing capabilities in design, manufacturing or both for each of the following types of Integrated Circuit.														
Type of Integrated Circuit	Currently (in 2017) has capabilities to:			Had capabilities 2013-2016			Interested in developing capabilities for U.S. Government							
	Design	Manufacture	Both	Design	Manufacture	Both	Re-constituting Capacity			Initiating Capacity				
Radiation Tolerant							Design				Design			
Radiation Hardened							Manufacture				Manufacture			
Neutron Hardened							Both				Both			
Single-Events Effects Resistant - Destructive							Neither				Neither			
Single-Event Effects Resistant - Nondestructive							Neither				Neither			
Does your organization design or manufacture Radiation Tolerant, Radiation Hardened, Neutron Hardened or Single-Event Effects Resistant Integrated Circuits?							Yes/No			If no, proceed to Section 4.				
3.b Identify your organization's capabilities to design and/or manufacture custom Integrated Circuit products that are Radiation Tolerant, Radiation Hardened, Neutron Hardened or Single-Event Effects Resistant at locations in the United States.														
Capability to Design and/or Manufacture - by Material Type														
<i>(Select all that apply - A blank response is counted as "No capability")</i>														
	Amorphous Silicon	Bulk Silicon	Silicon on Insulator	Silicon Germanium	Silicon on Sapphire	Silicon Carbide	Aluminum Gallium Arsenide	Gallium Arsenide	Gallium Nitride	Indium Phosphate	Antimonides	Organic Technologies	Carbon Based Technologies (e.g., nanotubes)	Superconducting Materials
Radiation Tolerant	Design													
Radiation Hardened	Manufacture													
Neutron Hardened	Both													
Single-Event Effects Resistant - Destructive	Neither													
Single-Event Effects Resistant - Non-Destructive														
Radiation Tolerant: Integrated circuit products incorporating design features and/or physical characteristics with limited capability to resist effects from radiation induced damage (ionizing dose) from industrial sources, electromagnetic pulses, weapons systems, and charged particles in space that can damage circuitry and render a device inoperable.														
Radiation Hardened: Integrated circuit products incorporating design features and/or physical characteristics that demonstrate a capability to resist effects from radiation-induced damage (ionizing dose) from industrial sources, electromagnetic pulses, weapons systems, or charged particles in space that can damage circuitry and render a device inoperable.														
Neutron Hardened: Integrated circuit products incorporating design features and/or physical characteristics that can withstand the damaging effects of high-speed neutrons, gamma rays, and electromagnetic pulses that accompany a nuclear weapons detonation.														
Single-Event Effects (SEE) Resistant - Destructive: Resistant to effects caused by a single energetic particle striking an Integrated Circuit (IC) device. Performance of the IC device is not compromised to a point where it is inoperable or not reliable for executing a mission as a result of event latch-up, burnout, or gate rupture, or snapback. [Immune to destructive SEEs up to an ion linear energy transfer (LET) of 80 MeV.cm2/mg.]														
Single-Event Effects Resistant - Non-Destructive: Resistant to effects caused by a single energetic particle striking an Integrated Circuit (IC) device. Performance of the IC device is not compromised to a point where it is inoperable or not reliable for executing a mission as a result of event upset, transient, or functional interrupt. [Immune to non-destructive SEEs is at an LET of 30-40 MeV.cm2/mg.]														
*Organization possesses manufacturing process technology to achieve radiation tolerance, hardening, or neutron hardening.														
Comments:														

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FACILITY LEVEL RESPONSE																
Section 4 Manufacturing Capabilities & Production Rates																
Does your organization manufacture Integrated Circuits? Yes/No [(if no, proceed to section 4c)]																
4.a 1) State the average manufacturing capacity utilization rates at your U.S. -based fabrication facility for the years 2013-2016. Then, 2) state the maximum number of wafer starts possible per week at your manufacturing facility; 3) state the actual average wafer starts per week at your facility; and 4) indicate whether this facility will be operating through 2021.																
Average Manufacturing Capacity Utilization Rates																
2013	2014	2015	2016	2016 Maximum number of Wafer Starts Per Week*	2016 Average Actual Wafer Starts Per Week**	Will this Facility Operate Through 2021?										
%	%	%	%	#	#	Yes/No										
*Normalized to 8-inch wafer equivalents.																
**Assumes 7-days-a-week operations.																
Note: a 100% utilization rate equals full operation with no downtime beyond that necessary for maintenance.																
4.b Specify the maximum Wafer Start capacity per week of your facility in 2016 in the United States by technology node, wafer size, and material type.																
Wafer Starts Per Week by Circuit Technology Node, Wafer Size & Material Type																
(State your wafer-start-per-week capacity -- A blank response is counted as "No capability")																
Minimum Technology Node Capability [nanometers]	-- by Wafer Size	Amorphous Silicon	Bulk Silicon	Silicon on Insulator	Silicon Germanium	Silicon on Sapphire	Silicon Carbide	Aluminum Gallium Arsenide	Gallium Arsenide	Gallium Nitride	Indium Phosphate	Antimonides	Organic Technologies	Carbon-Based Technologies (e.g., nanotubes)	Superconducting Materials	
		2- or 3-inch	Write In #													
		4-inch														
		6-inch														
		8-inch														
		12-inch														
7* - 10,000																
Comments:																
Note: 10,000 nanometers equals 10 micrometers *Respond to this specification if your organization expects to develop a capability to work at this Technology Node by 2021.																
BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act																

FACILITY LEVEL RESPONSE

Section 4 Mask Production and Capability

Does your organization currently have captive, in-house Integrated Circuit mask-making capability? Yes/No [If no, proceed to section 5]

4.c Identify all technology nodes (nanometer ranges) for which your organization is capable of producing masks at company-owned and operated facilities located in 1) the United States; and 2) in company-owned and operated facilities sited at non-U.S. locations.

Mask Technology Node (Nanometers)

(Select all that apply -- A blank response is counted as "No Capability")

Location	10000 - 6000	<6000 - 3000	<3000 - 1500	<1000 - 800	<800 - 500	<500 - 350	<350 - 250	<250 - 180	<180-130	<130 - 90	<90 -65	<65 - 45	<45-32	<32-28	<22-14	<10-7	<7
U.S.		Non-U.S.	Both														

Indicate the percentages of your organization's Binary and Phase-Shift mask production that are fulfilled in-house and by external mask makers.

Binary Mask Blanks					Phase-Shift Mask Blanks				
What percent of your organization's binary mask requirements are fulfilled by mask production performed:	In-House		by External Mask Makers		What percent of your organization's phase-shift mask requirements are fulfilled by mask production performed:	In-House		by External Mask Makers	
	U.S.	Non-U.S.	U.S.	Non-U.S.		U.S.	Non-U.S.	U.S.	Non-U.S.
	%	%	%	%		%	%	%	%

Comments:

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

CORPORATE LEVEL RESPONSE

Section 5: Performance of Production Steps – Wafer Processing & Die Packaging

Does your organization manufacture Integrated Circuits? **Yes/No** **[If no, proceed to section 6]**

1) Identify the Integrated Circuit wafer processing and wafer die packaging steps that your organization performs at its facilities in the United States and at facilities it owns in Non-U.S. locations. 2) Identify the names of the supplier(s) that your organization employs to perform wafer processing and die packaging activities at facilities outside the United States and provide the country locations where that work is performed. Select all that apply -- A blank response is counted as "No Capability."

Wafer Processing and Packaging Steps	U.S.	Non-U.S. Location	Country/Countries of Company-Owned Facilities			List of Suppliers						
			Country #1	Country #2	Country #3	Equipment Supplier #1	Equipment Supplier Country #1	Equipment Supplier #2 Name	Equipment Supplier Country #2	Equipment Supplier #3 Name	Equipment Supplier Country #3	
Wafer Thinning												
Backgrinding	Yes/No	Yes/No										
Other [Write In]												
Wafer Dicing												
Saw Blade	Yes/No	Yes/No										
Laser Dicing												
Plasma Dicing												
Other [Write In]												
Interconnects												
Wired Bonding	Yes/No	Yes/No										
Solder Bumping												
Stud Bumping												
Pillar												
Redistribution Layer Connects												
Other [Write In]												
Circuit Bonding												
Direct Die Film (DDF) Attach	Yes/No	Yes/No										
Silver Glass Attach												
Leaded Solder Attach												
Gold Silicon Eutectic Attach												
Wafer-to-Wafer												
Other [Write In]												
Substrate/Packaging												
Ceramic	Yes/No	Yes/No										
Organic												
Through Silicon Via												
Flexible												
Other [Write In]												

Comments:

CORPORATE LEVEL RESPONSE

Section 6a: On-Die INPUT/OUTPUT Integrated Circuit Devices & Enabling Firmware

State the percentage of Integrated Circuit On-Die Input/Output Controllers and Firmware used by your organization in 2016 that were 1) produced internally at company facilities located in the U.S. and at Non-U.S. company locations; 2) licensed from U.S. companies, and 3) licensed from non-U.S. companies. Secondly, identify the top three non- U.S. suppliers and countries that were sources of these controllers and firmware used in products manufactured by your company in 2016. Select all that apply -- A blank response is counted as "No Capability."

Company Produced / Licensed On-Die Input/Output Controllers and Firmware						Non-U.S. Countries and Suppliers					
Type of On-die Hardware Protocol Controller & Firmware Controlled Device	Internally Produced at Company Locations in U.S.	Internally Produced at Company Locations Outside the U.S.	Licensed from U.S. Companies	Licensed from non-U.S. Companies	Total (must add up to 100%)	Supplier #1 Name	Country #1	Supplier #2 Name	Country #2	Supplier #3 Name	Country #3
PCI Express - Controller	%	%	%	%	%						
PCI Express - Firmware											
Ethernet (1G, 10G, 25G, 100G) - Controller											
Ethernet (1G, 10G, 25G, 100G) - Firmware											
USB (1.0, 2.0, 3.0) - Controller											
USB (1.0, 2.0, 3.0) - Firmware											
SATA - Controller											
SATA - Firmware											
Thunderbolt - Controller											
Thunderbolt - Firmware											
Firewire - Controller											
Firewire - Firmware											
Memory - DDR3 and DDR4 - Controller											
Memory - DDR3 and DDR4 - Firmware											
ZigBee - Controller											
ZigBee - Firmware											
Bluetooth - Controller											
Bluetooth - Firmware											
802.11 - Controller											
802.11 - Firmware											
Other - Controller [Write in]											
Other - Firmware [Write in]											

Comments:

CORPORATE LEVEL RESPONSE

Section 6b: Embedded Integrated Circuit Bit Cell and Memory Compiler Intellectual Property Sources

For your analog, Application Specific Integrated Circuit and Field Programmable Gate Array products, state the percentage of embedded Integrated Circuit bit cell and memory compiler intellectual property used by your organization in 2016 that was 1) produced internally at company facilities located in the U.S. and at Non-U.S. company locations; 2) licensed from U.S. companies, and 3) licensed from non-U.S. companies. Secondly, identify the top three non- U.S. suppliers and countries that were sources of bit cell and memory compiler intellectual property used in products manufactured by your company in 2016. Select all that apply -- A blank response is counted as "No Capability."

Company Produced / Licensed Bit Cell and Memory Compiler IP						Country and Sources of Bit Cell, Memory Compiler IP					
Type of Memory Device IP	Internally Produced at Company Locations in U.S.	Internally Produced at Company Locations Outside the U.S.	Licensed from U.S. Companies	Licensed from non-U.S. Companies	Total (must add up to 100%)	Supplier #1 Name	Country #1	Supplier #2 Name	Country #2	Supplier #3 Name	Country #3
Embedded EEPROM – Bit Cell	%	%	%	%	%						
Embedded EEPROM – Memory Compiler											
Embedded FLASH – Bit Cell											
Embedded FLASH – Memory Compiler											
Embedded SRAM – Bit Cell											
Embedded SRAM – Memory Compiler											
Embedded DRAM – Bit Cell											
Embedded DRAM – Memory Compiler											
Embedded Other – Bit Cell	[Write in]										
Embedded Other – Memory Compiler	[Write in]										
Comments:											

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

CORPORATE LEVEL RESPONSE

Section 7a Performance of Production Functions for the Design of Integrated Circuits

Answer the questions on this page ONLY if your organization operates design facilities in the United States to produce Integrated Circuit products. If your organization does not operate design facilities in the United States, proceed to Section 7b.

Identify practices from the list below that reflect; 1) your organization's business methods in regard to execution of the eight design functions listed along the top of this page; 2) its practices and plans on outsourcing Integrated Circuit design.

Respond to All Questions	Integrated Circuit Design Functions								
	Analog	Digital	RTL Design*	Synthesis**	Physical Layout***	Functional Verification****	Simulation	Test Vector Generation*****	Other (Specify Here)
1. In 2016 performed the following Integrated Circuit Design Steps at facilities in the United States that it owns and operates:	Yes/No/Not Applicable								
2. Did not design at its own U.S. facilities, but contracted with other U.S.-based organizations to perform the design tasks at their U.S. facilities.	Yes/No/Not Applicable								
3. For the 2017-2021, my organization expects to retain capability to perform the following Integrated Circuit design steps at facilities in the United States that it owns and operates.	Yes/No/Not Applicable								
4. For 2017-2021 period, my organization will secure other U.S.-based vendors to complete these design steps at their facilities in the United States.	Yes/No/Not Applicable								
5. Anticipates that the organization's capabilities to perform the following the eight design steps facilities in the United States will:	Increase/Decrease/No Change								
6. Expects that its use of outsourcing in 2017-2021 will :	Increase/Decrease/No Change								
7. In 2016, my organization outsourced the following Integrated Circuit design steps to facilities located outside of the United States that it owns and operates:	Yes/No/Unknown								
8. The following Integrated Circuit design steps were out-sourced in 2016 to non-U.S. companies operating at non-U.S. locations:	Yes/No/Unknown								
9. The three primary reasons why my organization outsources Integrated Circuit design steps to non-U's locations are:	Reason # 1			Reason # 2			Reason # 3		
10. In the space provided, identify the top five countries to which your organization outsources Integrated Circuit design:	Country #1			Country #2			Country #3		
				Country #4			Country #5		
Comments:									

Complete the Next Page, Section 7b, if your organization outsources Integrated Circuit manufacturing steps to non-U.S. locations.

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

<---- Reasons for Outsourcing		
Tariff avoidance	Lower costs	Joint venture
Proximity to customer	Market access	Availability of skilled labor
Government subsidies	Production efficiency	Other

CORPORATE LEVEL RESPONSE

Section 7b Performance of Production Functions for the Manufacture of Integrated Circuits

Answer the questions on this page ONLY if your organization operates manufacturing facilities in the United States to produce Integrated Circuit products. If your organization does not operate manufacturing facilities in the United States, proceed to Section 7c.

Identify practices from the list below that reflect; 1) your organization's business methods in regard to execution of the eight manufacturing functions listed along the top of this page; 2) its practices and plans on outsourcing Integrated Circuit manufacturing.

Respond to All Questions	Integrated Circuit Manufacturing Functions								
	Mask Making	Wafer Manufacturing (Front End)	Wafer Manufacturing (Back End)	E-Test	Wafer Sorting	Dicing	Packaging	Final Test & Inspection	Other (Specify Here)
1. In 2016 performed the following Integrated Circuit Manufacturing Steps at facilities in the United States that it owns and operates:	Yes/No/Not Applicable								
2. Did not manufacture at its own U.S. facilities, but contracted with other U.S.-based organizations to perform the manufacturing tasks at their U.S. facilities.	Yes/No/Not Applicable								
3. For the 2017-2021, my organization expects to retain capability to perform the following Integrated Circuit manufacturing steps at facilities in the United States that it owns and operates.	Yes/No/Not Applicable								
4. For 2017-2021 period, my organization will secure other U.S.-based vendors to complete these manufacturing steps at their facilities in the United States.	Yes/No/Not Applicable								
5. Anticipates that the organization's capabilities to perform the following the eight manufacturing steps facilities in the United States will:	Increase/Decrease/No Change								
6. Expects that its use of outsourcing in 2017-2021 will :	Increase/Decrease/No Change								
7. In 2016, my organization outsourced the following Integrated Circuit manufacturing steps to facilities located outside of the United States that it owns and operates:	Yes/No/Unknown								
8. The following Integrated Circuit manufacturing steps were out-sourced in 2016 to non-U.S. companies operating at non-U.S. locations:	Yes/No/Unknown								
9. The three primary reasons why my organization outsources Integrated Circuit manufacturing steps to non-U's locations are:	Reason # 1			Reason # 2			Reason # 3		
10. In the space provided, identify the top five countries to which your organization outsources Integrated Circuit manufacturing:	Country #1			Country #2			Country #3		
				Country #4			Country #5		
Comments:									

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

<---- Reasons for Outsourcing		
Tariff avoidance	Lower costs	Joint venture
Proximity to customer	Market access	Availability of skilled labor
Government subsidies	Production efficiency	Other

Previous Page		Table of Contents																	Next Page																					
CORPORATE LEVEL RESPONSE																																								
Section 7c Outsourcing of Production Steps for the Design and Manufacture of Integrated Circuits																																								
Specify the characteristics of the Integrated Circuit products for which your organization outsources Design and/or Manufacturing Steps.																																								
If your organization does not outsource Integrated Circuit design or manufacturing facilities in the United States, proceed to Section 8 .																																								
Outsourced Design - by Device Type, Material, & Circuit Technology Node (Select all that apply -- A blank response is counted as "No Capability")																																								
Device Types	Capability						Semiconductor Material Types										Circuit Technology Node [nanometers]																							
	Conventional IC Products	Radiation Tolerant	Radiation Hardened	Neutron Hardened	Single-Event Effects Resistant - Destructive	Single-Event Effects Resistant - Non-Destructive	Amorphous Silicon	Bulk Silicon	Silicon on Insulator	Silicon Germanium	Silicon on Sapphire	Silicon Carbide	Aluminum Gallium Arsenide	Gallium Arsenide	Gallium Nitride	Indium Phosphide	Antimonides	Organic Technologies	Carbon Based Technologies (e.g., nanotubes)	Superconducting Materials	10,000 - 6,000	3,000 - 6,000	1,500 - 3,000	1,000 - 1,500	800 - 1,000	500 - 800	350 - 500	250 - 350	180 - 250	130 - 180	90 - 130	65 - 90	45 - 60	32 - 45	28 - 32	14 - 22	7 - 10	< 7		
Analog/Linear Technologies	Design																																							
Digital Logic Technologies	Manufacture																																							
Digital Signal Processors	Both																																							
Field Programmable Gate Arrays	Neither																																							
One-time, Electrically Programmable Gate Arrays																																								
Mask Programmable Gate Arrays																																								
Structured ASICs [a.k.a. Structured Arrays; Platform ASICs]																																								
Standard Cell ASICs [a.k.a. cell-based ASICs]																																								
Custom ASICs																																								
MMIC** Technologies																																								
Mixed Signal Technologies																																								
Processors																																								
Nonvolatile Memory																																								
3-D Nonvolatile Memory																																								
SRAM																																								
DRAM - DDR3																																								
DRAM - DDR4																																								
IR* Focal Plane Arrays																																								
Anti-Tamper Technology																																								
Display Electronics																																								
MEMS Technologies																																								
Optical/Photonic Technologies																																								
RF Technologies																																								
Other: [Write In]																																								
Comments:																																								
BUSINESS CONFIDENTIAL - Per Section 705(d) of the Defense Production Act																																								

CORPORATE LEVEL RESPONSE

Section 8a: National Security Requirements - The Trusted Access Program

1. Does your organization have in place today an ability to design or manufacture custom Integrated Circuit products in a trusted* environment located in the United States that conforms to Department of Defense (DOD) standards for the conduct of such work?	Design/Manufacture/Both/Not Applicable
2. Has your organization been certified by DOD's Trusted Access Program Office at the Defense Microelectronics Activity (DMEA) as a 'trusted' supplier of Integrated Circuit products?	Yes/No/Not Applicable
3. Is your organization planning to seek certification by DOD's Trusted Access Program Office at the Defense Microelectronics Activity as a 'trusted' supplier of Integrated Circuit products?	Yes/No/Unknown
4. How does your organization view the return on investment associated with expenses incurred for securing accreditation through DMEA's Trusted Access Program?	Favorably/Unfavorably/No opinion
5. Is your organization familiar with alternatives to the current Trusted Access Program and, if so, which do you assess most favorably? (Split manufacturing, Trust by design, Tiers of trust)	Unfamiliar/Split Manufacturing/Tiers of Trust/Trust by Design

6. If your organization has recently withdrawn from operating a facility from the Trusted Access Program or is planning to do so, identify the affected facility by name and address and explain the reason for your organization's action in the space below.

Name:		Address:	
--------------	--	-----------------	--

Explanation:	
---------------------	--

7. If you answered "Yes" to Question 1, 2, or 3 identify the manufacturing and/or design facilities for which (1) certification has been awarded, (2) the facilities for which certification is being sought or may be sought, and (3) the primary business activity at that facility.

Facility Name(s)	City	State	Awarded Certification	Seeking Certification	Business Activity
			Yes/No	Yes/No	Design
					Manufacture
					Package, Test, Assembly

Comments:	
------------------	--

* "Trusted" refers to certification from the Defense Microelectronics Activity's Trusted Accreditation Program to design or manufacture Integrated Circuits.

CORPORATE LEVEL RESPONSE

Section 8b National Security Requirements - Outlook on Future Capability to Supply Integrated Circuit Products

For each of the Integrated Circuit devices listed, indicate 1) how your organization's ability to design and/or manufacture at its United States facilities may change in the next five years. 2) State the primary factor contributing to this change (if applicable); and 3) Identify the types of customers that would be affected by this change.

Device Types	<i>(Select all that apply -- A blank response is counted as "No Capability")</i>					
	Integrated Circuit Design			Integrated Circuit Manufacturing		
	Future Capability	Primary Factor	Types of Affected Customers	Future Capability	Primary Factor	Types of Affected Customers
Analog/Linear Technologies						
Digital Logic Technologies	Increase	Labor costs	Commercial (COTS standard Products)			
Digital Signal Processors	Decrease	Cost of Modernization	Commercial(Custom Products)			
Field Programmable Gate Arrays	Cease	Low order volume	Industrial (COTS standard Products)			
One-time, Electrically Programmable Gate Arrays	No Change	Manufacturing Difficulty	Industrial(Custom Products)			
Mask Programmable Gate Arrays	N/A	Meeting DOD Requirements	U.S. Government Agencies - excluding DOD (Custom Products)			
Structured ASICs [a.k.a. Structured Arrays; Platform ASICs]		Regulations	DOD (Custom Products)			
Standard Cell ASICs [a.k.a. cell-based ASICs]		Technology lag	DOD (COTS standard Products)			
Custom ASICs		Low Profitability	DOD (Custom Products)			
MMIC** Technologies		Trusted Certification Costs	U.S. Government Agencies - excluding DOD COTS standard Products)			
Mixed Signal Technologies		Rising Commercial Orders				
Processors		Rising US Government Orders				
Nonvolatile Memory		Design Difficulty				
3-D Nonvolatile Memory						
SRAM						
DRAM - DDR3						
DRAM - DDR4						
IR*-Focal Plane Arrays						
Anti-Tamper Technology						
Display Electronics						
MEMS Technologies						
Optical/Photonic Technologies						
RF Technologies						
Other [Write In]						

Comments:

CORPORATE LEVEL RESPONSE

Section 9: Manufacturing Equipment Suppliers

For each of the listed processes, identify those used by your organization by 1) Writing in principal equipment type 2) Primary practice for maintaining equipment and 3) your organization's three primary suppliers of that equipment. If you only have one supplier, enter "None" for suppliers two and three. A blank response will be counted as "no capability."

Integrated Circuit Manufacturing Processes - Front to Back	Primary Equipment Suppliers - By Process																		
	(Select all that apply -- A blank response is counted as "No Capability")																		
	Type of Equipment #1	Type of Equipment #2	Type of Equipment #3	Primary Company Practice - Equipment Maintenance Performed By:	Equipment Supplier #1	City	State	Country	Single or Sole Source Supplier	Equipment Supplier #2	City	State	Country	Single or Sole Source Supplier	Equipment Supplier #3	City	State	Country	Single or Sole Source Supplier
Wet Wafer Cleaning	Write In			Company employees															
Piranha solution				Manufacturer															
RCA clean				OEM Distributor															
Photolithography				Third-Party Contractor															
Ion implantation																			
Dry etching																			
Wet etching																			
Plasma strip/Ashing																			
Thermal treatments Rapid thermal anneal																			
Furnace anneals																			
Furnace Thermal oxidation																			
Rapid thermal oxidation																			
Epitaxy																			
Chemical vapor deposition (CVD)																			
Plasma enhanced chemical vapor deposition (PECVD)																			
Rapid thermal chemical vapor deposition																			
Physical vapor deposition (PVD)																			
Molecular beam epitaxy (MBE)																			
Electrochemical deposition (ECD)																			
Chemical-mechanical planarization (CMP)																			
Inline monitor testing at wafer level [interstitial/ silver /kerf structures]																			
Wafer bumping (flip chip products only)																			
Through silicon via (TSV), back side thinning and backside metal redistribution [if a 3-D chip]																			
Wafer functional test (testing of design structures)																			
Wafer backgrinding (Smartcard, PCMCIA cards, other applications)																			
Die preparation Wafer mounting / Tape																			
Die cutting/dicing																			
IC packaging Die attachment/bonding																			
IC bonding Wire bonding (if wirebond product)																			
Thermosonic bonding																			
Wafer bonding (if a wafer level bonded assembly)																			
Tape Automated Bonding (TAB)																			
IC encapsulation Baking																			
Plating																			
Laser marking																			
Trim and form																			
IC testing																			

Comments:

FACILITY LEVEL RESPONSE

Section 10 Employment

A.	Indicate the primary Integrated Circuit business line that accounts for the majority of FTE Employees and Contractors at this facility:					Design/Manufacture/Package, Test, and Assembly	
	Record the total number of full time equivalent (FTE) employees BY FACILITY in your U.S./domestic operations by labor type for calendar years 2013-2016. Do not double count personnel who may perform cross-operational roles.						
	Reporting Schedule:			Calendar Year/Fiscal Year			
				2013	2014	2015	2016
	B.	1	FTE Employees				
	2	FTE Contractors					
	3	Number of US Citizens					
	4	Number of non-US Citizens					
C.	List the top five countries (other than the U.S.) from which your location has non-U.S. citizen workers (employees or contractors), and identify the number of each type of visa or green card holder associated with each country.						
	Country	H-1B	H-2B	F-1	Green Card	Total (Auto Sum)	
		#	#		#	#	
C.	List the number of staff located at this facility working in the positions listed below that support Integrated Circuit design or Integrated Circuit product manufacturing (fabrication). Blanks will be interpreted as meaning that there are no personnel on site at this facility performing the listed job function.						
	Occupational Category - Design of Integrated Circuits	Number of Staff	Occupational Category - Manufacture of Integrated Circuits	Number of Staff	Occupational Category - Manufacture of Integrated Circuits	Number of Staff	
	Silicon Design Architect		Environmental Engineering		Engineering Manager		
	Researcher		Safety Engineer		Manufacturing Manager		
	Quality Engineers		Planning/Procurement/Supply Chain		Facilities Engineering/Technician		
	Pre Silicon Validation Engineer		Statistician		Shift Manager		
	Post Silicon Validation Engineer		Process Engineer/Technician		Failure Analysis Engineer		
	Layout Engineer		Product Engineer		Integration Engineer		
	Debug Engineer		Reticle Engineer		Automation Engineer/Technician		
	Electronic Engineer		Manufacturing Technician		Factory Manager		
	RF/Analog Engineer		Equipment Engineer		Yield Engineer		
	Integration Engineer		Industrial Engineer				
	CAD Engineer						
	Thermal Engineer						
	Mechanical Engineer						
Packaging Engineer							
Program Manager							
D.	State 1) the average age of the staff working at this location; and 2) the percentage of this staff that is projected to leave or retire in the next five years.	Type of Integrated Circuit Facility	Design/Manufacturing	Average Age	#	% Projected to leave or retire in next five years	%

Comments:

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

CORPORATE LEVEL RESPONSE

Section 11: Sales

For years 2013-2016 provide your organization's U.S. and non-U.S. sales information. For 2017, project whether your sales will increase, decrease or remain unchanged.

Reporting Schedule:		Calendar Year/Fiscal Year				
Record \$ in Thousands, e.g. \$12,000.00 = survey input of \$12		2013	2014	2015	2016	2017*
A.	Total Sales, all Customers (in \$)					
B.	Total IC-Related Sales, all Customers U.S./Non-U.S. (in \$)					
C.	Total U.S. IC-Related Sales - as a % of B					
D.	Total Non-U.S. IC-Related Sales - as a % of B					
E.	Direct sales of Custom IC Products (including design services) to U.S. Government customers (in \$)					
F.	Is your organization dependent of U.S. Government sales for its ongoing viability?					Yes/No
G.	Identify your organization's 1) top five commercial customers, their country location, and estimated revenue from them for 2016; 2) state the primary type of IC product supplied (IC designs or fabricated product) sold to them and the estimated revenue for 2016 attributed to the primary product; and 3) indicate whether the products were supplied under DMEA Trusted Access certification.					
	Top 5 Commercial Customers by Revenue (\$)					
	Commercial End Customer Name	Country	Estimated 2016 Revenue - All Product Sales	Prime Product Type (Based on Revenue)	Estimated 2016 Revenue -Primary Product	DMEA Trusted Program
				Drop-Down of 23 Product Classes		Yes/No
H.	Identify your organization's 1) top five U.S. Government customers, the associated federal agency, and estimated revenue from them for 2016; 2) state the primary type of IC product supplied (IC designs or fabricated product) sold to them and the estimated revenue for 2016 attributed to the primary product; and 3) indicate whether the products were supplied under DMEA Trusted Access certification.					
	Top 5 U.S. Government Customers for Custom Products (Non-COTS) by Revenue (\$)					
	Government End Customer Name	Federal Agency	Estimated 2016 Revenue - All Product Sales	Prime Product Type (Based on Revenue)	Estimated 2016 Revenue -Primary Product	DMEA Trusted Program
				Drop-Down of 23 Product Classes		Yes/No

Comments:

Disclosure of financial information is required for both public and private companies. All financial data is treated as Business Proprietary and exempt from Freedom of Information Act (FOIA) requests. Providing BIS with financial information will not result in the public release of you organization's financial data.

CORPORATE LEVEL RESPONSE

Section 12: Financials

Provide the following Income Statement and Balance Sheet financial line items for your organization for years 2013-2016 below. Furnish full-year estimates for 2016.

Reporting Schedule:		(Fiscal Year/Calendar Year)			
Income Statement (Select Line Items)		Record \$ in Thousands, e.g. \$12,000.00 = survey input of \$12			
		2013	2014	2015	2016
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:		(Corporate/Whole Organization)			
Reporting Schedule:		(Fiscal Year/Calendar Year)			
Balance Sheet (Select Line Items)		Record \$ in Thousands, e.g. \$12,000.00 = survey input of \$12			
		2013	2014	2015	2016
A.	Cash				
B.	Inventories				
C.	Current Assets				
D.	Total Assets				
E.	Current Liabilities				
F.	Total Liabilities				

Comments:

Disclosure of financial information is required for both public and private companies. All financial data is treated as Business Proprietary and exempt from Freedom of Information Act (FOIA) requests. Providing BIS with financial information will not result in the public release of you organization's financial data.

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

Reporting of Significant One-Time Events

Year	Instruction: Provide an explanation of any significant one-time events that would skew assessments of the economic performance of your organization.
2013	
2014	
2015	
2016	

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Section 13: Acquisitions, Divestitures, Mergers and Joint Ventures

CORPORATE LEVEL RESPONSE

A. Acquisitions, Divestitures, and Mergers

How many Integrated Circuit-related acquisitions, divestitures and mergers has your organization been party to since 2013? If none, a "0" must be placed in the box.

Identify your organization's five most recent Integrated Circuit-related acquisitions, divestitures and mergers, going back no more than five years. Identify the primary objective of each event listed and provide a description.

	Organization Name	Type of Activity	Country	Year	Primary Objective	Explain (optional)
1		Acquisition				
2		Divestiture				
3		Merger				
4						
5						

B. Joint Ventures

How many Integrated Circuit-related joint ventures does your organization currently participate in? If none, a "0" must be placed in the box.

Identify your organization's current Integrated Circuit-related joint venture relationships, including public/private R&D partnerships. Select the primary objective of the joint venture and provide a description.

	Organization Name	Country	Year	Primary Objective	Explain (optional)
1					
2					
3					
4					
5					

C.

1 Have any non-U.S. governments (including sovereign wealth funds) invested, directly or indirectly, in your organization - and collectively control five percent or more of stockholder voting shares? Yes - Directly/Yes - Indirectly/No

If you answered "yes" explain in the space below the nature of the investment and identify the non-U.S. government(s).

Comments:

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<--- Primary Objective Dropdown

Access to government contracts	Market Access
Access to intellectual property	R&D access/coordination
Bankruptcy restructuring	Reduce costs
Broaden customer base	Regulatory
Develop new capabilities	Tax-related
Expand Product Lines	Vertical integration
	Other objective (Explain)

<--- Primary Objective Dropdown

Cost Reduction	Market Access
Access to technology	Product Improvements
Other	Risk sharing

Section 14: Capital Expenditures

CORPORATE LEVEL RESPONSE

A.	Did your organization track capital expenditure financials between 2013 and 2016?		If not, enter "0" in section B							
Capital Expenditure Reporting Schedule:		Calendar Year/Fiscal Year								
B.	Capital Expenditure Category	Record \$ in Thousands, e.g. \$12,000.00 = survey input of \$12								
		2013		2014		2015		2016		
		U.S.	Non-U.S.	U.S.	Non-U.S.	U.S.	Non-U.S.	U.S.	Non-U.S.	
	1	Total Capital Expenditures								
	2	Total Integrated Circuit-related Capital Expenditures								
	3	Machinery and Equipment [as a % of row 1]								
	4	IT, Computers, Software [as a % of row 1]								
	5	Land, Buildings, and Leasehold Improvements [as a % of row 1]								
6	Other [Write In]									
Lines 1 through 4 must total 100%		0%		0%		0%		0%		
C.	From 2013-2016, what was the most significant factor in dictating your organization's Capital Expenditures?									
	Explain:									
D.	Rank your organization's top 3 capital expenditure priorities for 2013-2016, anticipated priorities for 2017-2021, and provide a brief description.									
	Priority		2013-2016	2017-2021	Description					
	1	Replace old machinery and equipment	1	1						
	2	Improve productivity	2	2						
	3	Expand capacity	3	3						
	4	Add new capability								
	5	Upgrade technology								
	6	Meet specific customer requirements								
7	Other [Write In]									
Comments:										

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Section 15: Research & Development

CORPORATE LEVEL RESPONSE

A.	Does your organization perform Research and Development (R&D)?	Yes/No	If not, proceed to section 16
----	--	--------	-------------------------------

In Question B, record your organization's total R&D dollar expenditures for years 2013 - 2016.
 In Question C, identify your organization's R&D funding sources, by percent of total R&D dollars sourced.
 Note: Total annual funding sources reported (section C) can exceed total expenditures reported (section B) for a given year.

Reporting Schedule:	Calendar Year/Fiscal Year
---------------------	---------------------------

		Record \$ in Thousands, e.g. \$12,000.00 = survey input of \$12				
		2013	2014	2015	2016	
B.	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%
		Record \$ in Thousands, e.g. \$12,000.00 = survey input of \$12				
		2013	2014	2015	2016	
C.	1	Total R&D Funding Sources	\$			
	2	Parent Company (Internal)	%			
	3	Total Federal Government	%			
	4	State and Local Government	%			
	5	U.S. Private Entity [includes industry, universities]	%			
	6	Foreign Investors [includes industry, governments]	%			
	8	Other (specify here)	%			
	9	Total of 2 - 8 (must equal 100%)	0%	0%	0%	0%

Data Confirmation
Total 2016 R&D Expenditures
None

D.	1) Report the percentages of your organization's total annual R&D expenditures for supporting Integrated Circuit product design and manufacturing activity performed in U.S. and Non-U.S. locations for 2013-2016					
	R&D Expenditures For Integrated Circuit Design and/or Manufacturing (Corporate or Integrated Circuit Business Unit)					
		Total Integrated Circuit-Related R&D Expenditures	2013	2014	2015	2016
		Percent Performed at All U.S. Locations	%			
		Percent Performed at All Non-U.S. Locations	%			
	Total Integrated Circuit R&D Expenditures	\$				

Comments:

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Section 16a - Export Regulation & Trade Issues: Regulatory Impacts								
CORPORATE LEVEL RESPONSE								
A.	Identify the Integrated Circuit-related products that your organization exports:			IC Designs	Yes/No			
				Partially Built ICs	Yes/No			
				Complete IC Products	Yes/No			
B.	Do you utilize the U.S. export control system (Export Administration Regulations [EAR]/Commerce Control List [CCL]), or (International Traffic in Arms Regulations [ITAR]/U.S. Munitions List [USML]) for the export of Integrated Circuit-related products and services (including design services and manufacturing)?			EAR/CCL	Yes/No			
	If you do not utilize U.S. export control licenses for Integrated Circuit -related products or services, select "No" in the box and proceed to Section 17.			ITAR/USML	Yes/No			
C.	Has your organization lost export sales opportunities of Integrated Circuit-related products or services to non-U.S. competitors because of U.S. export controls (EAR/CCL or ITAR/USML)? If "Yes," select the total dollar amount of lost export sales opportunities from 2013-2016.			Lost Sales?*	Lost Export Sales Estimate			
				EAR/CCL	Yes/No		\$	
				ITAR/USML	Yes/No		\$	
*Lost Sales: Are attributed to binding, written supply contracts (not estimates) of a stated dollar value that could not be fulfilled because a review of export regulations determined that the Integrated Circuit-related products (designs, technology, and or manufactured devices) could not be exported to a designated customer or country.								
D.	State whether U.S. export control regulations since 2013 directly affected your organization's Integrated Circuit business in any of the ways listed below. If "Yes," explain in the box provided at right.							
	Impact		Response		Explanation			
	1	Altered your organization's Integrated Circuit-related research and development program	Y/N					
	2	Avoided the export of products or services that are subject to EAR/CCL or ITAR/USML related controls.	EAR/CCL					
			ITAR/USML					
			Both					
	3	Altered the composition of specific Integrated Circuit-related business lines	N/A					
			EAR/CCL					
			ITAR/USML					
	4	Located or relocated Integrated Circuit-related facilities outside the United States due to regulatory burdens.	Both					
N/A								
EAR/CCL								
5	Non-U.S. organization's avoided buying U.S.-origin Integrated Circuit-related products or services.	ITAR/USML						
		Both						
		N/A						
6	Spurred non-U.S. organizations to offer "ITAR/USML-free" or "EAR/CCL-free" Integrated Circuit-related products or services.	Y/N						
E.	State whether reforms in export control regulations (EAR/CCL and ITAR/USML) have affected your Integrated Circuit business:						Yes/No	
F.	For the two technologies listed below, identify how reforms in export control have affected your Integrated Circuit product business by: 1) Selecting the top three regulatory impacts from the list below; 2) indicating from the list provided how export control reforms may have changed the range of companies and number of companies your organizations does business with as well as your overall business volume.							
	Impacts of Export Control Reforms							
	Technology	Regulatory Impacts				Range of Trading Companies	Number of Trading Countries	Business Volume
		Impact #1	Impact #2		Impact #3			
	Microwave Monolithic Integrated Circuits	Reduced Paperwork	Wider business opportunities	Other #1		Increase	Increase	Increase
		Increased Paperwork	Fewer business opportunities			Decrease	Decrease	Decrease
	Transmit/Receive Modules	Reduced Licensing Time	Removed some controls	Other #2		No Change	No Change	No Change
Increased Licensing Time		Added some controls			Other			
Comments:								
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CORPORATE LEVEL RESPONSE

Section 17a - Trade and Intellectual Property Issues

From the list below, identify the methods your organization uses to transfer Integrated Circuit-related design and manufacturing intellectual property on a legal, authorized basis to U.S. and non-U.S. destinations.

A		Methods	US Location(s)	Non-U.S. Location(s)	Design IP or Manufacturing IP
	1	Licensing Intellectual Property	Yes/No	Yes/No	Design IP
	2	Joint Ventures			Manufacturing IP
	3	Research collaborations			Both
	4	Participation in scientific/technical conferences			
	5	Information provided to potential investors			
	6	Debt Financing			
	7	Non-Disclosure Agreements			
	8	Other [Write in]			

From the list below, identify the methods by which unauthorized transfers of your company's Integrated Circuit-related design and manufacturing intellectual property have occurred. If yes, identify the types of IP.

B		Methods	US Location(s)	Non-U.S. Location(s)	Design IP or Manufacturing IP
	1	Cyber security intrusions	Yes/No	Yes/No	Design IP
	2	Planting staff in your company			Manufacturing IP
	3	Physical break-ins at company facilities			Both
	4	Business partners			
	5	Dumpster Diving			
	6	Former employees			
	7	Employees			
	8	External IT System Contractors			
	9	Persons performing R&D with your company			
	10	Company campus Wi-Fi Network Interceptions			
	11	Persons speaking to outside industry analysts/experts			
	12	Persons speaking with your bankers/financiers			
	13	Persons speaking with contractors and suppliers			
	14	Violation of Non-Disclosure Agreements			
	15	Other [Write in]			

C	1	In the years 2013-2016, did your organization experience unauthorized transfers of Integrated Circuit-related design and/or manufacturing Intellectual Property?			Type of IP	
					Design/Manufacturing/Both/Neither	
	2	If "Yes," report the number of instances this occurred for Design IP and Manufacturing IP?			Design IP	Manufacturing IP
	3	Does your company know the country location(s) of the most frequent perpetrators of the unauthorized transfers of your company's Integrated Circuit-related intellectual property? If "Yes" identify the countries.			Yes/No	Country
4	Was the intellectual property subject to any the following export control regulations:			CCL/EAR	Yes/No/Not applicable	
				USML/ITAR	Yes/No/Not applicable	
5	Did your organization report the incident(s) to the:		U.S. Department of Defense	Yes/No		
			U.S. Department of Commerce			
			U.S. Department of State			
			Federal Bureau of Investigation			
			State/Local police authorities			
			U.S. Department of Energy			
			Other [Write In]			
6	In the past five years has your organization experienced a loss of access to critical Integrated Circuit-related Intellectual Property?			Yes/No/Not applicable		

Comments:

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Section 17b: Trade and Intellectual Property Issues

CORPORATE LEVEL RESPONSE

Identify all trade practices and requirements that your organization has encountered at any time since 2013 in countries where it currently conducts business or seeks to do business directly or indirectly through third parties. Then, identify up to three countries where these practices or requirements have been encountered and whether they persist to date.

Trade Practices	Yes/No	Country #1	Persists Today?	Country #2	Persists Today?	Country #3	Persists Today?
Tariffs on the Integrated Circuit-related products and services that your organization sells	Yes	Yes	Yes				
National trade policy to phase out the use of Integrated Circuit-related products designed or made outside of their country	No	No	No				
Threats to boycott your organization's products unless your organization allows substantial investment by entities from that country		N/A	N/A				
Manipulation of your organization's publicly traded stock as a consequence of refusing to transfer intellectual property or establish design and/or manufacturing operations in that country							
Denied timely access to the country's market							
Comments:							
Conditional Trade Requirements	Yes/No	Country #1	Persists Today?	Country #2	Persists Today?	Country #3	Persists Today?
Transfer of Integrated Circuit-related device intellectual property (trade secrets, patents, etc.)	Yes	Yes	Yes				
Transfer of Integrated Circuit-related manufacturing process intellectual property (trade secrets, patents, etc.)	No	No	No				
Outsource design of Integrated Circuit-related products to their country		N/A	N/A				
Establish Integrated Circuit-related design operations in their country							
Outsource the manufacture of Integrated Circuit-related products to their country							
Establish Integrated Circuit-related manufacturing operations in their country							
Required investment/equity from non-US companies in order to maintain market access							
Mandatory joint ventures as means to achieve transfers on design and/or manufacturing intellectual property and know-how							
Comments:							
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Section 18: Competitiveness

CORPORATE LEVEL RESPONSE

Rank your organization's top five issues affecting the long-term competitiveness of your organization and provide an explanation.				
	Issue	2013-2016	2017-2021	Explanation (optional):
A.	Aging equipment, facilities, or infrastructure	1	1	
	Aging workforce	2	2	
	Competition - domestic	3	3	
	Competition - foreign	4	4	
	Counterfeit parts	5	5	
	Cybersecurity			
	Environmental regulations/remediation - U.S.			
	Environmental regulations/remediation - non-U.S.			
	Export controls; ITAR/USML; EAR/CCL			
	Forced localization			
	Government acquisition processes			
	Government purchasing volatility			
	Government regulatory burden			
	Healthcare costs			
	Health and safety regulations			
	Imports			
	Industrial Espionage			
	Intellectual property/patent infringement			
	Labor availability/costs			
	Material input availability			
	Product obsolescence			
	Pension costs			
	Proximity to customers			
	Proximity to suppliers			
	R&D costs			
	Reduction in commercial demand			
	Reduction in USG demand			
	Taxes			
	Worker/skills retention			
	Other	(specify)		
Other	(specify)			
Comments:				

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CORPORATE LEVEL RESPONSE

Section 19: Cyber Security

Estimate your organization's spending on physical and cyber security, in thousands of dollars, and state the number of security incidents your organization has recorded in each year.										
A.	Reporting Schedule:		Record \$ in Thousands, e.g. \$12,000.00 = survey input of \$12							
			2013		2014		2015		2016*	
			Incidents	Expenditures	Incidents	Expenditures	Incidents	Expenditures	Incidents	Expenditures
	1	Cyber Security	#	\$	#	\$	#	\$	#	\$
	2	Physical Security	#	\$	#	\$	#	\$	#	\$
* Furnish full year estimates for 2016 if data is unavailable.										
B.	1	Is your organization aware of Defense Federal Acquisition Regulation Supplement (DFARS) 252.204-7009, Limitations on the Use or Disclosure of Third-Party Contractor Reported Cyber Incident Information? http://www.acq.osd.mil/dpap/dars/dfars/html/current/252204.htm							Yes/No	
	2	Who is responsible for administering your organization's internal computer network(s)?							Dropdown	
	3	Who is responsible for administering your organization's external computer network(s)?							Dropdown	
C.	1	Is the computer or computer network that houses your organization's Commercially Sensitive Information (CSI) connected to the Internet, either directly or via an intermediary network or server? *This includes customer/client information, financial information and records, human resources information, intellectual property information, internal communications, manufacturing and production line information, patent and trademark information, research and development information, regulatory/compliance information, and supplier/supply chain information.							Yes/No	
	2	Does your organization either restrict or prohibit your external cloud service or external data storage provider(s) from storing Commercially Sensitive Information (CSI) outside of the U.S.?						External Cloud Service Providers	Restrict/Prohibit/No/Unknown	
								External Data Storage Providers	Restrict/Prohibit/No/Unknown	
		Estimate the percentage of your organization's Commercially Sensitive Information (CSI) that is stored with:						External Cloud Service Providers	(% Entry Only)	
								External Data Storage Providers	(% Entry Only)	
	3	Does your organization use the following cloud-based security protocols?		Advanced authentication (biometrics, tokens etc.)	<Yes/No>	End-point protection	<Yes/No>	Identity and access management	<Yes/No>	
				Real-time monitoring/analytics	<Yes/No>	Threat intelligence	<Yes/No>	Other (specify)	<Yes/No>	
	Explain:									
	4	Does your organization have structured methods for protecting the following types of Commercially Sensitive Information (see definitions)?		<Yes/No/Not Applicable>	Explain					
		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										
Other (specify)										
D.	Using the drop-down lists and free-text entries below, indicate the type(s) and severity of any cybersecurity events that have occurred at this organization from 2013-2016.									
		Event	Impact Level	Frequency	Explain (incident and follow-up)					
	1	(Choose from Drop-Down)	Severe	#	Write in					
	2	(Choose from Drop-Down)	Moderate							
	3	(Choose from Drop-Down)	Low							
	4	Other Cybersecurity Event	(Specify)	None						
5	Other Cybersecurity Event	(Specify)								

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 organization, and a designated point of contact.

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Section 20: 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: XXX@bis.doc.gov. Be sure to retain a copy for your records and to facilitate any necessary edits or clarifications.

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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