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**USPAE**

U.S. Partnership for  
Assured Electronics

**Office of the Deputy Assistant Secretary of Defense for Industrial Policy**

**Department of Defense**

**Request for Written Comments:**

**One-Year Response to Executive Order 14017, “America’s Supply Chains”**

**Docket #: DoD-2021-OS-0100**

**Deadline: October 13, 2021**

**Submitted by: IPC and USPAE**

**Executive Summary**

IPC, USPAE, and our more than 1,500 U.S. member companies in the electronics manufacturing industry commend the Department of Defense’s (DoD) efforts to improve supply chains for the defense industrial base as part of President Biden’s Executive Order (EO) 14017, *America’s Supply Chains*.

Our industry supports more than 5 million U.S. jobs and drives more than \$700 billion in U.S. GDP. This includes all segments of electronics manufacturing, such as designers, printed circuit board (PCB) manufacturers, contract and assembly companies, suppliers, and original equipment manufacturers (OEMs) in aerospace, defense, medical, automotive, and other industrial sectors reliant on electronics.

The electronics manufacturing industry is at the heart of the modern economy. It is a large, vertical industry in its own right, but it is also a horizontal industry that cuts across every sector of the economy. Electronics are critical in the performance of automobiles, aircraft, medical equipment, retail, industrial operations, IT and telecom, consumer technologies, and more. Given that our industry supply chain is highly complex and dependent upon foreign sources, we urge the DoD to engage directly, closely, and regularly with industry trade associations, such as IPC, to gain better understanding and insight of the microelectronics supply chain.

DoD and industry can grow and improve the defense industrial base in microelectronics, and avoid supply chain disruptions, by partnering to address some of the most critical challenges that include a skilled workforce, manufacturing, research and development (R&D), and trusted source components for defense electronics systems. To initiate this, IPC offers to host a series of meetings or workshops that brings together industry, academia, and government to explore and address supply chain issues affecting the defense industrial base.

## **Microelectronics – Erosion of U.S. PCB Manufacturers and Assembly Companies**

Advanced electronics are at the heart of most defense and security systems and many other kinds of critical infrastructure. However, as electronics have become more and more crucial in these vital systems, supply chain disruptions have become a greater concern. The U.S. military is still the most advanced military in the world and U.S. companies are still the top innovators globally, but constraints or compromises involving electronics system components – even tiny, inexpensive ones – can bring entire systems to a halt.

The last 25 years have been a turbulent period for U.S. electronics manufacturers, marked by significant contraction and financial instability. Thousands have closed their doors and Asia now produces more than 70 percent of all electronics manufactured globally. For example, the U.S. PCB industry, which once accounted for more than 30 percent of total global PCB production, today accounts for less than 5 percent. The number of U.S. PCB manufacturers and assemblers has drastically shrunk. In 2000, there were more than 1,500 PCB companies in North America. Today, there are fewer than 199, and the number is expected to fall further. Additionally, electronics assembly has experienced a similar trajectory. All electronics and products with electronics in them are reliant upon electronics manufacturing services (EMS) companies, but U.S. assembly accounts for only 17 percent of the total market and only four of the top 20 EMS companies are based in the United States. Among other negative impacts, the loss of U.S. electronics manufacturing is detrimental to military capabilities and readiness, creating a dramatic weakening of the nation's industrial base and unnecessary risks to U.S. national security.

According to the [FY 2020 Industrial Capabilities Report to Congress](#), prepared by OSD A&S Industrial Policy, “the number of small and medium [PCB] manufacturers supplying the DoD continued to diminish in 2020, falling by 16.3 percent and 25.6 percent in the last five years, respectively. The DoD is at risk of losing capability due to the mergers and acquisitions of small domestic [PCB] manufacturing companies that are purchased by larger companies. The small companies' niche products and services necessary for national defense systems may not provide sufficient revenue or opportunity for growth for their new, larger owners. This growth will further edge out the small [PCB] manufacturers who provide essential products and services for national defense systems.”

The report also identified a four-part program of a defense industrial strategy that we support.

1. “Reshore our defense industrial base and supply chains to the United States and to allies, starting with microelectronics, and restore our shipbuilding base.”
2. “Build a modern manufacturing and engineering workforce and research and development (R&D) base.”
3. “Continue to modernize the defense acquisition process to fit 21st century realities.”
4. “Find new ways to partner private sector innovation with public sector resources and demand.”

The erosion of the domestic industrial base for electronics did not come without warnings. A slew of industry reports and government studies have tracked the decline of the industry, even as policymakers during this period prioritized the growth of the global marketplace over the strength and resiliency of

the domestic industrial base. Segments of the electronics industry were viewed as expendable so long as U.S. companies led the innovation and owned the intellectual property.

That view has turned out to be short-sighted as geopolitical developments and the COVID-19 pandemic have reinforced the need for secure and resilient supply chains. At the outset of the pandemic, U.S. manufacturers could not sufficiently ramp up production of badly needed emergency medical equipment, including ventilators, due to a shortage of PCBs. In other cases, PCBs were manufactured domestically, but assembled in Asia, only to be shipped back to customers in the United States. Invoking the Defense Production Act was not without complications given the U.S. Government's lack of visibility into the electronics supply chain.

### **A Resilient Microelectronics Supply Chain Requires a Holistic Approach**

We are supportive of the U.S. Government's efforts to address semiconductor supply chain issues, but we urge a holistic approach to the electronics supply chain. Advancements in semiconductor technology have always been intricately linked to advancements in PCB fabrication and assembly, but the interdependence is growing even greater with developments in microelectronics. The almost singular focus on the semiconductor industry ignores the larger ecosystem that supports electronics manufacturing. Far too many parts of this ecosystem remain weak despite repeated warnings from experts inside and outside government about the consequences of a degraded industrial base. The result is a stark reality of the United States being a leader in designing technologies but being unable to build the most advanced electronic systems.

The United States needs to take a silicon-to-systems approach that positions itself for long-term leadership in innovation and assurance of supply chain resiliency and security. Raw silicon does not offer functionality. Semiconductors are a vitally important component in electronics, but they are only one component among thousands that are placed on PCBs by EMS companies. For instance, to build the fastest cars, engines would not be the sole focus. They would be one of many parts of the car to be fine-tuned. The same holistic approach applies to advanced electronics. After all, engines do not win races; cars do.

The United States was once a leader in electronics manufacturing. The United States cannot bring back the supply chain overnight, but we can build back our ability to manufacture high-value, low-volume electronics as a stepping-stone to greater manufacturing strength. However, it cannot be done unless the U.S. Government recognizes that electronics manufacturing is changing dramatically and how to spur investment by small and medium-sized electronics manufacturers that operate on thin-margins.

### **Trusted Microelectronics Supply Chain**

We encourage support of "trusted supplier" programs in domestic and international supply chains for critical sectors of national security, as there is a need for greater supply chain visibility and transparency. Additionally, we urge establishing metrics for defense electronics industrial base resiliency, with capacity, capabilities, security, and geographic diversity as key factors.

Specifically, we urge:

- Implementation of Section 841 of the enacted FY 2021 National Defense Authorization Act (NDAA). Section 841 included provisions that will bolster the security and resiliency of the U.S.

defense electronics supply chain. Most notably, Section 841 prohibits the sourcing of defense PCBs from China, Russia, North Korea, and Iran. Congress considered coverage of commercial-off-the-shelf (COTS) electronics as well, but NDAA conferees decided the issue needed further study.

Section 841 also included a requirement that the DoD enter into an agreement with a Federally Funded Research and Development Center (FFRDC) to conduct a study on COTS electronics, and expanded implementation of Section 224 of the FY 2020 NDAA. Section 224 directed the Secretary of Defense to apply trusted supplier requirements to the acquisition of covered PCBs and printed circuit board assemblies (PCBAs).

- We encourage DoD to leverage IPC-1791 – *Trusted Electronic Designer, Fabricator and Assembler Requirements* to ensure trusted sourcing for critical military and national security applications. IPC-1791 is an industry standard that outlines requirements, policies, and procedures for printed board design, fabricating, and assembly organizations and companies to become trusted sources for markets requiring high levels of confidence in the integrity of delivered products, such as military and aerospace.

This IPC certification program was developed through collaboration of industry leaders and government officials, including the DoD Executive Agent for PCBs. It has broad industry support, but it has not been integrated into DoD sourcing requirements. The DoD has a great opportunity to strengthen and shape the defense microelectronics supply chain through IPC-1791 as it is a valuable tool to certify electronics manufacturers as a trusted source and establish a community of suppliers for the DoD. We encourage the DoD to leverage this standard for trusted sourcing of critical military and national security applications.

### **DoD and Industry Partnership – A Path to a Strong and Resilient Microelectronics Supply Chain**

Microelectronics supply chains are highly complex, relying heavily on foreign sources for components that can harm or manipulate the devices in which they are installed. The best approach for the DoD to gain visibility and insights into these supply chains is to engage with industry directly and regularly with industry trade associations such as IPC.

Below are some areas where industry insights could help DoD understand the changes needed in policies, procedures, and culture to ensure success.

1. Most DoD supply chains are not designed for the desired outcome.
  - a. The suppliers that DoD chooses for a cost-efficient supply chain are different than those for a resilient, or secure, or responsive supply chain.
  - b. The primary determinant of DoD supply chain participants is cost as the most common form of sourcing is “three bids and a buy,” especially for sustainment items.
  - c. DoD needs a means (culture, processes, tools) to design, assemble, and manage these supply chains in a timely manner.
2. DoD views most manufacturers as vendors, not partners.

- a. Successful commercial supply chains stress partnerships, which includes sharing information, reducing friction, and helping each other.
  - b. Research has shown that most DoD suppliers are discouraged by interaction with the DoD.
  - c. DoD suppliers are abandoning defense work as it becomes more burdensome.
3. DoD lacks supply chain insights and data.
- a. Supply chain visibility and insights are crucial for everything from managing quality and delivery to planning how a demand surge might be handled.
  - b. Current contracting processes inhibit the sharing of information throughout most defense supply chains.
  - c. Many defense systems rely on little-known materials that come from potential adversaries, such as resins, spun glass, and electronic connectors.

We look forward to partnering with the DoD to address the critical supply chain challenges of the defense industrial base. We believe that a series of meetings or workshops hosted by IPC with industry, academia, and government will improve microelectronics supply chain issues and identify solutions.