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November 8, 2021

Defense Industrial Base Division, Office of Technology Evaluation
Bureau of Industry and Security
U.S. Department of Commerce

Submitted via Federal eRulemaking Portal: http://www.regulations.gov

Re: Applied Materials, Inc. comments in response to "Risks in the Semiconductor Supply Chain" Request for Information; 86 FR 53031; 0694-XC08; Docket Number BIS-2021-0036

Introduction

Headquartered in Santa Clara, California and founded in 1967, Applied Materials, provides manufacturing equipment, services and software to the global semiconductor, flat panel display, solar photovoltaic (PV) and related industries. Our customers include manufacturers of semiconductor wafers and chips, flat panel liquid crystal displays (LCDs), solar PV cells and modules, and other electronic devices.

Applied Materials welcomes the opportunity to provide our perspectives in response to the U.S. Department of Commerce's request for information on "Risks in the Semiconductor Supply Chain". As a user of semiconductors we put forward the following.

FRN question 2 - Questions for intermediate users and end users of semiconductor products or integrated circuits:

a) Identify your type of business and the types of products you sell?

Applied Materials Inc. is the world's leader in materials engineering solutions used to produce virtually every new chip and advanced display in the world. Specifically, Applied Materials provides wafer fabrication equipment to semiconductors manufacturers around the world. Applied Materials' technologies enable materials to be deposited which include insulators such as silicon nitride, conductors such as copper and tungsten, and compounds, such as ferromagnetic material. Our system technologies engineer material properties through "fine-tuning" of precursor materials and process variables such as temperature, pressure, electrical and magnetic fields, plasma, flow rate, and time. In addition to semiconductor manufacturing equipment, we provide equipment servicing and spares for that equipment.

As our technologies are utilized for the process creating and accurately depositing layers of material on a wafer's surface, our equipment incorporates a wide array of

semiconductor products. We rely on a global network of original equipment manufacturers (OEMs) to secure the semiconductor products that make up a critical part of our technology solutions.

b) What are the (general) applications for the semiconductor products and integrated circuits that you purchase?

Applied Materials develops and manufactures a wide portfolio of systems which offer a variety of materials engineering methods that enable a diverse array of wafer fabrication solutions. Our tools use advanced semiconductors to precisely control the way our equipment solutions create, shape, modify, analyze, and connect materials at the atomic scale to process wafers and build chips. We incorporate a large array of logic, memory and analog "chips" including programmable logic devices (PLCs), Field Programmable Gate Arrays (FPGAs), Sensors, Analog-to-Digital/Digital-to-Analog converters, Power Amplifiers, and DRAM and NAND memory. When incorporated into our systems, these "chips" play an important role in equipment programming, the generation and storage of systems data, and precision power control.

c) For the semiconductor products that your organization purchases, identify those that present the greatest challenge for your organization to acquire. For each product, identify the product attributes and purchases in 2019 and 2021, as well as average monthly orders in 2021. Then estimate the quantity of each product your organization would purchase in the next six months barring any production constraints as well as the amount your organization expects to actually be able to purchase. For each of your organization's top semiconductor products, estimate each product's lead times and your organization's inventory for (a) 2019 and (b) currently (in days)? Provide an explanation of any current delays or bottlenecks?

As mentioned in question (b) above, there are various key components for our systems. These include:

- Programmable Logic Devices (PLCs) – these are devices where our suppliers program firmware, specific to the supplier and Applied Materials specifications, to make the system components function properly
- Field Programmable Gate Arrays (FPGAs) – these are devices that are also programmable by our suppliers
- Sensors – these take real world physical parameters (Power, Current, Temperature, Voltage, etc.) and turn them into electrical signals that electrical circuits can process
- Analog to Digital converters, and Digital to Analog converters (A-to-D and D-to-A converters) – these take the electronic "real world" electrical signals,

and transfer them into digital signals that the FPGAs and PLCs can do their programming on, and vice versa

- Power Amplifiers – These generator power, with precision control, based on the direction of the digital to analog converters, from the programming of the PLCs and FPGAs.
- Memory – Store and process data for the devices to use

All of the devices listed above are essential to the function of our equipment systems as they are incorporated into sub-systems within a wide variety of equipment including those that generate plasmas used in the deposition and etching processes of semiconductor fabrication.

Conclusion

We again would like to thank the Department of Commerce, Bureau of Industry and Security for the opportunity to provide our unique perspective on the risks affecting the semiconductor supply chain. In the event there are any questions or follow up, please do not hesitate to contact us.

Sincerely,

John D. Kania
Managing Director, Government Affairs