

SIA Comments
On the
Draft Scope of the Risk Evaluation for 4,4'-(1-Methylethylidene)bis[2, 6-dibromophenol]

EPA-HQ-OPPT-2018-0462

CASRN 79-94-7

Submitted May 26, 2020

The Semiconductor Industry Association (SIA) submits these comments to the U.S. Environmental Protection Agency (EPA) on the Draft Scope of the Risk Evaluation for 4,4'-(1-Methylethylidene)bis[2, 6-dibromophenol] (TBBPA) (CASRN 79-94-7).

SIA is the trade association representing leading U.S. companies engaged in the design and manufacture of semiconductors. Semiconductors are the fundamental enabling technology of modern electronics that has transformed virtually all aspects of our economy, ranging from information technology, telecommunications, health care, transportation, energy, and national defense. The U.S. is the global leader in the semiconductor industry, and continued U.S. leadership in semiconductor technology is essential to America's continued global economic leadership. More information about SIA and the semiconductor industry is available at www.semiconductors.org.

Background on the Semiconductor Manufacturing Process and the Use of TBBPA

The use of TBBPA in the semiconductor industry occurs during a stage in the process known in the industry as "assembly, packaging and test" (APT). Semiconductor manufacturing involves three distinct stages of production:

- (1) research and design
- (2) front-end fabrication of finished wafers; and
- (3) back-end APT to prepare a device for integration into a circuit board or other electronic device.

The U.S. is a global leader in the research, design, and fabrication stages – which comprise 90 percent or more of the value of a single semiconductor. In the first stage, scientists and engineers conduct research and create designs for devices that perform specialized functions. These designs are photoimaged, deposited and etched on to a silicon wafer during the fabrication stage, conducted at advanced manufacturing facilities known as "fabs." Manufacturing occurs at the nanoscale and billions of transistors can be etched on a single square centimeter of silicon. A finished silicon wafer is shown in Figure 1.

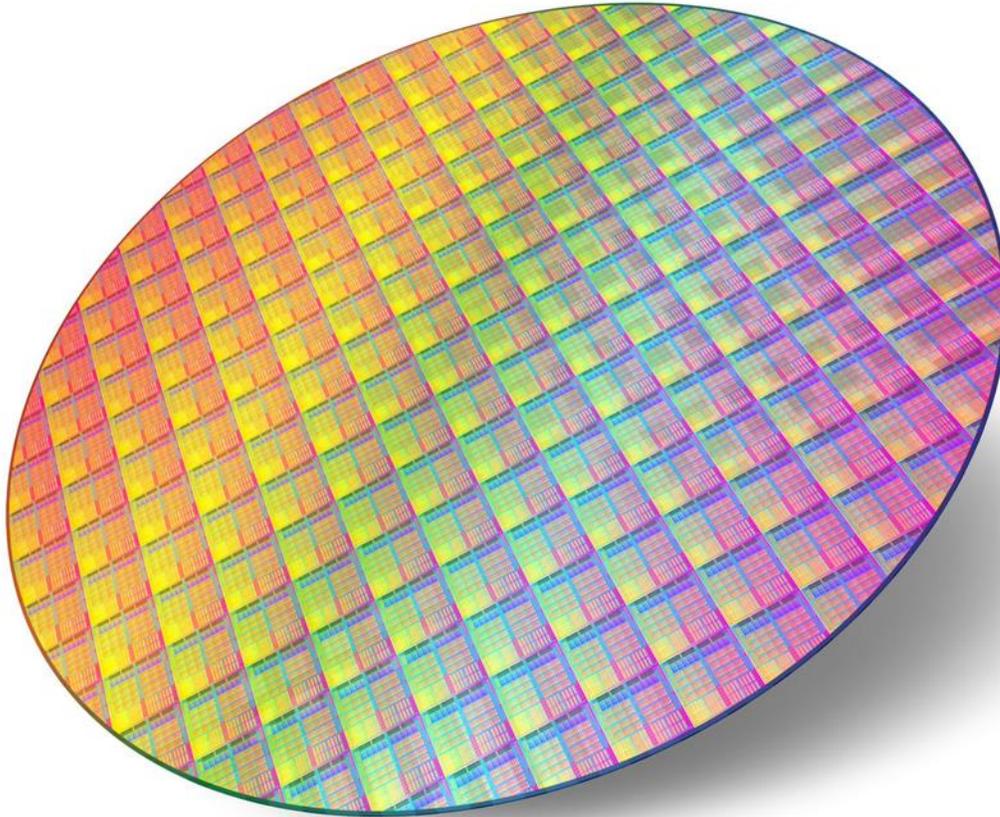


Figure 1: A finished silicon wafer. Each square is an individual semiconductor device.

During the APT stage, a finished semiconductor wafer is divided into individual “chips,” encased in a plastic or ceramic “package,” and tested. This step in the process is where TBBPA is used as a flame retardant in semiconductor packages. This step in the process prepares an individual “chip” for incorporation into a circuit board used in a finished electronic device (e.g., mobile phone, computer, automobile, etc.). TBBPA is one of the base chemicals components used to react with an epoxy and becomes part of a polymer that encases the chip to form the semiconductor package. The TBBPA is not available for extraction from the polymer because the TBBPA becomes a part of the polymer. Figure 2 depicts a packaged chip mounted on a circuit board.

Semiconductor manufacturers may also make modules that contain multiple chips on a circuit board. TBBPA may be a part of the resin system in the circuit board. Other articles imported by the semiconductor industry that may contain TBBPA include cables and transceivers. The SIA does not plan to address cables and transceivers.

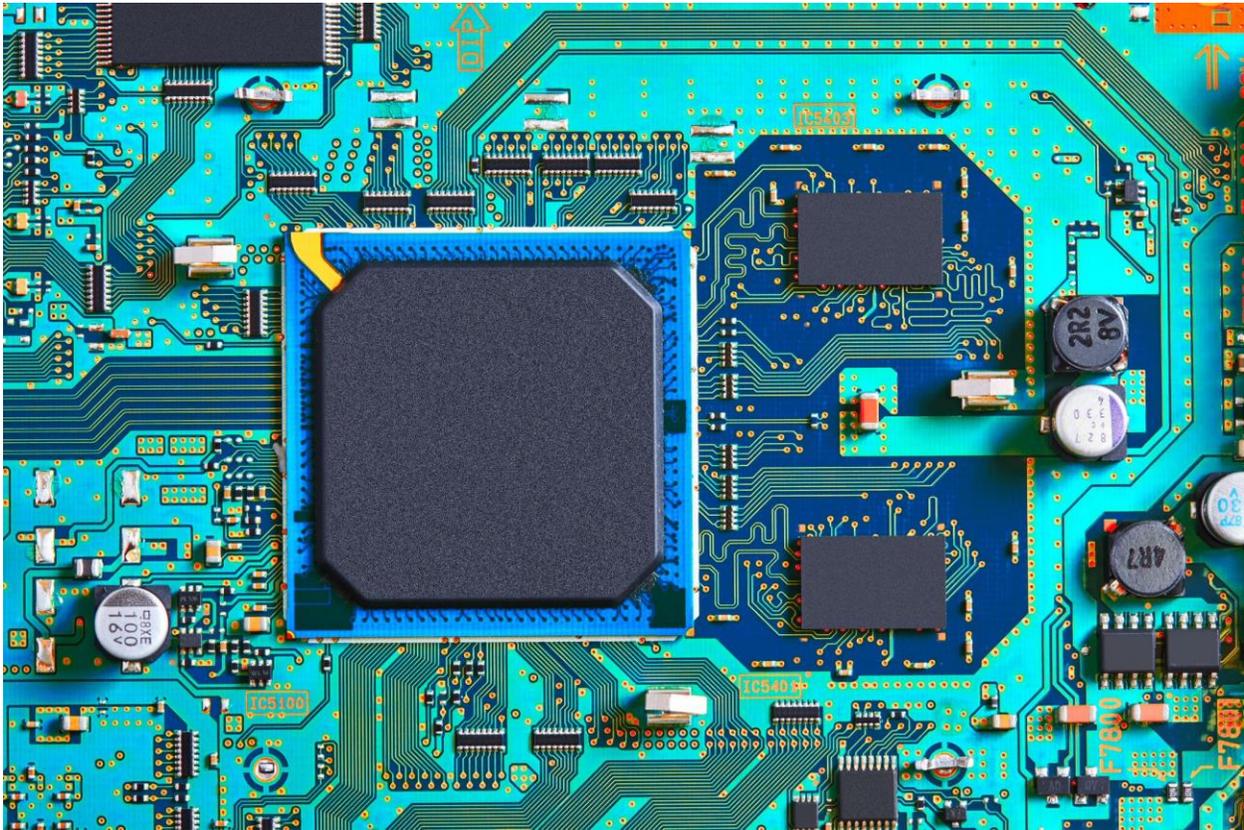


Figure 2: Module or populated circuit board

1. Uses of TBBPA in the Semiconductor Industry Occur Outside the U.S.

The APT process, where TBBPA is used as a flame retardant in “packages,” is conducted outside the U.S. APT facilities migrated outside the U.S. decades ago and are now generally located in southeast Asia (e.g., China, Taiwan, Malaysia, Singapore, Vietnam, Philippines, and Japan).

Section E.1.3.5 of the draft scoping document states that one facility in the “Semiconductor and Related Device Manufacturing” sector reported releases of TBBPA to TRI in 2017. The company that reported TBBPA releases to TRI is not an SIA member and it is unclear whether or not the company is a semiconductor manufacturer.

2. TBBPA Bound in a Finished Semiconductor Device is Imported to the U.S.

Finished semiconductor packages contain minute amounts of TBBPA bound in a polymer matrix, and these devices are imported to the U.S. for incorporation into a range of products throughout the economy. These are “articles” for purposes of TSCA regulation, and there is no opportunity for the release of TBBPA bound in the matrix of the finished product.

Conclusion

TBBPA has limited uses in packaged semiconductor chips and modules. These articles contain a polymer that includes the use of TBBPA in its starting compounds. The manufacture and use of the polymer are performed in manufacturing facilities located outside of the U.S. There is expected to be no means or opportunity to be released through normal use of the consumer product. It is important for EPA to focus their review of the semiconductor use to its presence bound in a matrix.