



FAQ120 (v1.2) January 20, 2004

## ***Pb-Free Solutions: Frequently Asked Questions***

---

Important note in nomenclature: Throughout this document, the chemical element lead will be referred to with the notation "Pb". This is to help avoid confusion with the semiconductor packaging term, lead, which represents the connection from some semiconductor packages to a printed circuit board (PCB).

### **Background**

#### **1. What is driving the move toward Pb-free products and processes in the electronics industry?**

Pb has long been recognized as a harmful environmental pollutant. The use of Pb in electronic products is an increasingly visible environmental and political concern. OEM initiatives and legislation are being implemented globally to drive the removal of Pb and other harmful materials from electronic products.

#### **2. What is RoHS and WEEE?**

RoHS and WEEE are European Union (EU) Directives for waste electrical and electronic equipment (WEEE) and for restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS). Among other things, these directives restrict the use of certain hazardous substances in electrical and electronic equipment shipped in to the EU as of July 1, 2006.

The substances identified by the WEEE Directive as hazardous are:

- Cadmium
- Mercury
- Hexavalent Chromium
- Polybrominated biphenyls (PBB)
- Polybrominated diphenyl ethers (PBDE)
- Lead (Pb)

The restrictions do not call for the total elimination of these substances but set an upper limit based upon weight. Pb content in lead plating or solder balls must be less than 0.1% by weight of solder.

**3. Are Pb-free products from Xilinx RoHS compliant?**

Yes.

**4. Where is Pb found in electronic devices?**

With respect to semiconductors, Pb can be found in two areas of electronic devices. The solder paste used to adhere and electrically connect a semiconductor device to a PCB contains Pb. The semiconductor package itself may also contain Pb in the lead or balls connected to the PCB and the internal solder connecting the semiconductor silicon to the package.

**5. How long has Xilinx had a Pb-free program in place?**

Xilinx instituted a Pb-free program in 1999. With a clearly defined roadmap and cooperation with technology partners and the supply chain, Xilinx has built a process to produce Pb-free packaged products that will meet the requirements and timelines of OEM initiatives and legislative directives such as RoHS and WEEE.

**6. How long has Xilinx been shipping Pb-free products to customers?**

Xilinx began shipping Pb-free products to customers in 2002.

**7. Does Xilinx or its suppliers participate in industry consortia that deal with Pb-free initiatives?**

Xilinx has always been committed to the advancement of the semiconductor industry with participation in many industry consortiums. Specific to Pb-free technology, Xilinx is involved in JEDEC/IPC conferences as well as NEMI.

## **Product Availability**

**8. What products does Xilinx offer in Pb-free packaging?**

Xilinx offers Pb-free packages for all current and planned future products. For the latest Pb-free availability, contact your local Xilinx sales representative/distribution partner.

**9. What package types does Xilinx offer in Pb-free?**

All lead-frame and wire-bond BGA packages offered for leading product families are available with Pb-free options. Flip-chip packages used on high performance products such as the Virtex-II Pro™ and Virtex-II™ series are in development and are expected to be qualified in 2005.

## 10. Can I still get Pb-based (SnPb) solutions from Xilinx?

At this time, Xilinx offers both Pb-based and Pb-free product options. At some time in the future however, legislation will dictate that all products be converted to Pb-free solutions.

## 11. What is the lead-time for Pb-free products?

As the demand for Pb-free packages increases, the lead-times will reach parity with current SnPb products. In the meantime, customers should budget 10-14 weeks for Pb-free products. Contact your local Xilinx sales representative/distribution partner for specific information.

## 12. Will there be a price differential for Pb-free solutions?

There will be no price adder for the leading product families such as Virtex-II, Virtex-II Pro, CoolRunner™-II, XC9500XL, Spartan™-3, Spartan-IIE, Platform Flash, and RocketPHY™ devices. Legacy product pricing may vary so check with your Xilinx sales representative / distribution partner for details.

## Product Information

### 13. What terminal finishes are used in Xilinx Pb-free packages?

For lead-frame packages, the plating material for the leads is 100% matte Sn. For wire-bond BGA packages, the solder balls use a Sn4.0Ag0.5Cu composition. Pb-free material for flip-chip packages is still under development by Xilinx as well as other industry leaders.

### 14. How can I distinguish between Pb-free and Pb-based (SnPb) products?

Pb-free products should be ordered with the new part number that incorporates an extra "G" in the package designator portion of the part number. Pb-free products are marked with the "G" as found in the part number.

### 15. Are there any changes required in device storage conditions or shelf life?

No.

### 16. Will Xilinx issue PCNs for Pb-free products?

The plan at this time is for Xilinx to issue PDNs for Pb-based (SnPb) products in lieu of the replacement Pb-free products. This will be done in the future in accordance with legislation requiring the elimination of Pb from all electronic products.

## Quality and Reliability

### 17. What qualifications has Xilinx done on Pb-free products?

Reliability tests include temperature cycles, temperature humidity, board level reliability, and tin whisker testing. Specific reliability information is available upon request through your local Xilinx sales representative.

**18. Will Pb-free products maintain the same moisture sensitivity level (MSL) as with Sn/Pb packages?**

Yes.

**19. Are Pb-free devices from Xilinx JEDEC compliant?**

Yes.

**20. Are Xilinx Pb-free products usable for both Pb-free and Pb-based manufacturing environments?**

Xilinx Pb-free solutions that are “backward compatible” enable customers to surface mount Pb-free components onto Pb-based PCBs and/or use Pb-free products with non-Pb-free technologies. Lead-frame packages from Xilinx are qualified as backward compatible. Pb-free wire-bond BGA and flip-chip packages are under evaluation for backward compatibility.

**21. What Pb-free packages from Xilinx are backward compatible?**

Pb-free lead-frame packages from Xilinx are backward compatible.

**22. Does Xilinx have a recommended reflow profile?**

The reflow profile should be optimized according to the user's board density, board size, etc. Xilinx provides guidelines on optimizing a reflow profile. The guidelines are available in application note XAPP427 which can be found on the Xilinx literature web site at

<http://www.xilinx.com/bvdocs/appnotes/xapp427.pdf>

## **For More Information**

**23. Where can I go for more information about Xilinx Pb-free program?**

For the latest information regarding Pb-free products, visit the Xilinx web site at [http://www.xilinx.com/system\\_resources/lead\\_free/index.htm](http://www.xilinx.com/system_resources/lead_free/index.htm) or contact your Xilinx sales representative or distribution partner.

## **Revision History**

The following table shows the revision history for this document.

Date	Version	Revision
10/28/03	1.0	Initial Xilinx release.
12/02/03	1.1	Updated questions 2, 3, 8, 10, 11, 14, and 16. Added question 13.
01/20/04	1.2	Updated questions 1, 3, 8, 10, 11, 12, 14, 16, and 21.