

## Pb-Free/RoHS Solutions

### Environmental Policy:

**Exar Corporation is committed to protecting the environment and individual health and safety. We shall comply with all environmental regulations, health and safety laws applicable to our business. We employ continual efforts to minimize the environmental impact of our products.**

### Environmental Highlights:

- 1 – All Exar products are free from mercury, cadmium, hexavalent chromium, PBB, and PBDE and they are in compliance with European RoHS requirements except for lead. Lead-free products (100% Sn) are also available upon request.
- 2 – Exar has qualified and introduced green mold compounds (not having phosphorous or brominated flame retardant) for all products.
- 3 – Exar is using matte tin for the lead finish for lead-free lead-frame products. Parts are subjected to heat treatment after tin plating to mitigate tin whisker growth.
- 4 – Exar will continue to support both standard and lead-free products after 7/1/2006 if possible.
- 5 – Exar lead-free products are compatible with standard Sn/Pb board assembly. Solder reflow peak temperature may be raised from 235C to 255C +/-5C for products which are not moisture sensitive (Jedec 020C; level 1). Moisture-sensitive parts are dry packed and customers need to pay attention to the bag labels for handling instructions.
- 6 – Exar key assembly suppliers and foundries are certified to ISO 14001, Environmental Management System Requirements.

## **Frequently Asked Questions**

### **Guidelines / Background**

1. Why the move toward Pb-free products and processes in the electronics industry?  
The use of Pb (lead) in electronic products is an increasingly visible environmental concern. OEM initiatives and legislation are being implemented globally to promote the discontinuance of Pb and other such materials from electronic products.
2. What are 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 into the EU effective 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. Please refer to the following web links for more details:

[http://europa.eu.int/index\\_ns\\_en.htm](http://europa.eu.int/index_ns_en.htm)

[http://www.aeanet.org/GovernmentAffairs/gajg\\_RoHS\\_Officialtext\\_27JAN2003.asp](http://www.aeanet.org/GovernmentAffairs/gajg_RoHS_Officialtext_27JAN2003.asp)

3. Are Pb-free products from Exar 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. Solder paste used for adherence and electrical connection of a semiconductor device to a PCB contains Pb. The semiconductor package itself may also contain Pb in the leads or balls connected to the PCB and the internal solder connecting the semiconductor silicon to the package.

5. How long has Exar had a Pb-free program in place?  
Exar initiated a Pb-free program in 2001. With a clearly defined road map and with the cooperation of industry partners and the supply chain, Exar has exercised a process to produce Pb-free packaged products and meets the requirements and timelines of legislative directives such as RoHS and WEEE.
6. How long has Exar been shipping Pb-free products to customers?  
Exar began shipping Pb-free products to customers in 2003.
7. Does Exar or its suppliers participate in industry consortia that deal with Pb-free initiatives?  
Exar is committed to the advancement of the semiconductor industry with participation in many industry consortia. Exar closely works with its assembly suppliers to maintain the required level of certification for continued business.
8. What are the differences between “Pb-free” and “Green”?  
In relation to various environmental policies and regulations, "Green" usually refers to "Environmental Friendliness. Pb-free has been mentioned and focused more often in electronics industry as part of "green" compliance because Pb has been added into solder joining and lead finish materials for soldering applications. Pb-free electronic components can generally meet RoHS criteria. Some customers, especially in Japan, have expressed concerns about any form of halogenated compounds such as brominated compounds used in molding compounds of electronic packages. As a result, "green" compounds were developed to eliminate the use of any type of flame retardant. Exar has qualified green compounds for lead-frame packages. The implementation will be complete by October 2004. For array packages, green BOM (bill of material) refers to green substrate, green compound and green die attach material and Pb-free balls.
9. What products does Exar offer in Pb-free packaging?  
Exar offers Pb-free products for all current and planned plastic packages with lead-frames. For the latest Pb-free availability, contact your local Exar sales representative/distribution partner.
10. Can I still get Pb-based (Sn/Pb) solutions from Exar?  
Exar offers both Pb-based and Pb-free product options. However, at some time in the future, legislation might dictate that all products be converted to Pb-free solutions.
11. Is there any delivery constraint for Pb-free products?  
The lead-times will mirror the current Sn/Pb products. Contact your local Exar sales representative/distribution partner for specific information.

12. Will there be a pricing difference for Pb-free solutions?

Generally, there will be no price adder for the Pb-free products. However there may be a few exceptions so check with your Exar sales representative / distribution partner for details.

## Product Information

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

For plastic lead-frame packages, the plating material for the leads is 100% matte tin (Sn). For BGA packages, the solder balls use a SnAgCu (SAC) composition. Pb-free lead finish for CDIP is being evaluated. The current option is Sn/Cu solder dip.

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

To identify a Pb-free part, Exar has adopted and implemented the following policy for Pb-free tracking purposes:

a. Ordering:

Pb-free part numbers shall carry a “-F” suffix unless otherwise specified, e.g., XRT73L03IV-F. The “F” P/N is required when placing orders for Pb-free versions of Exar standard parts. “F” is not required when a product is only offered in Pb free parts.

b. Identifier:

Pb-free identifier, “F”, shall be marked (both top and bottom if applicable) on Pb-free packages as a prefix to the datecode (YYWW) unless otherwise specified. There will be no other difference in product marking between standard and Pb- free parts.

The Sn/Pb products shall not contain “F” as above.

Pb-free labeling on the packing container is being considered. Exar will follow industry standard or common practice.

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

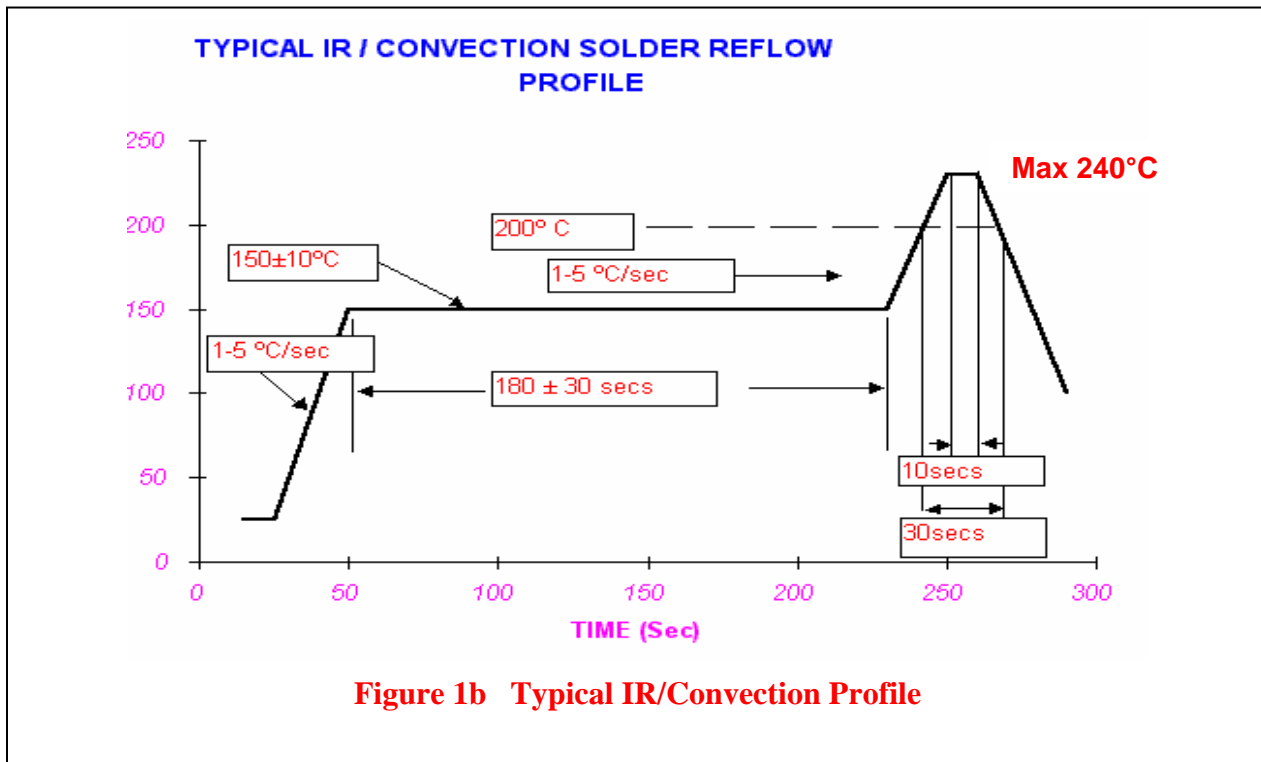
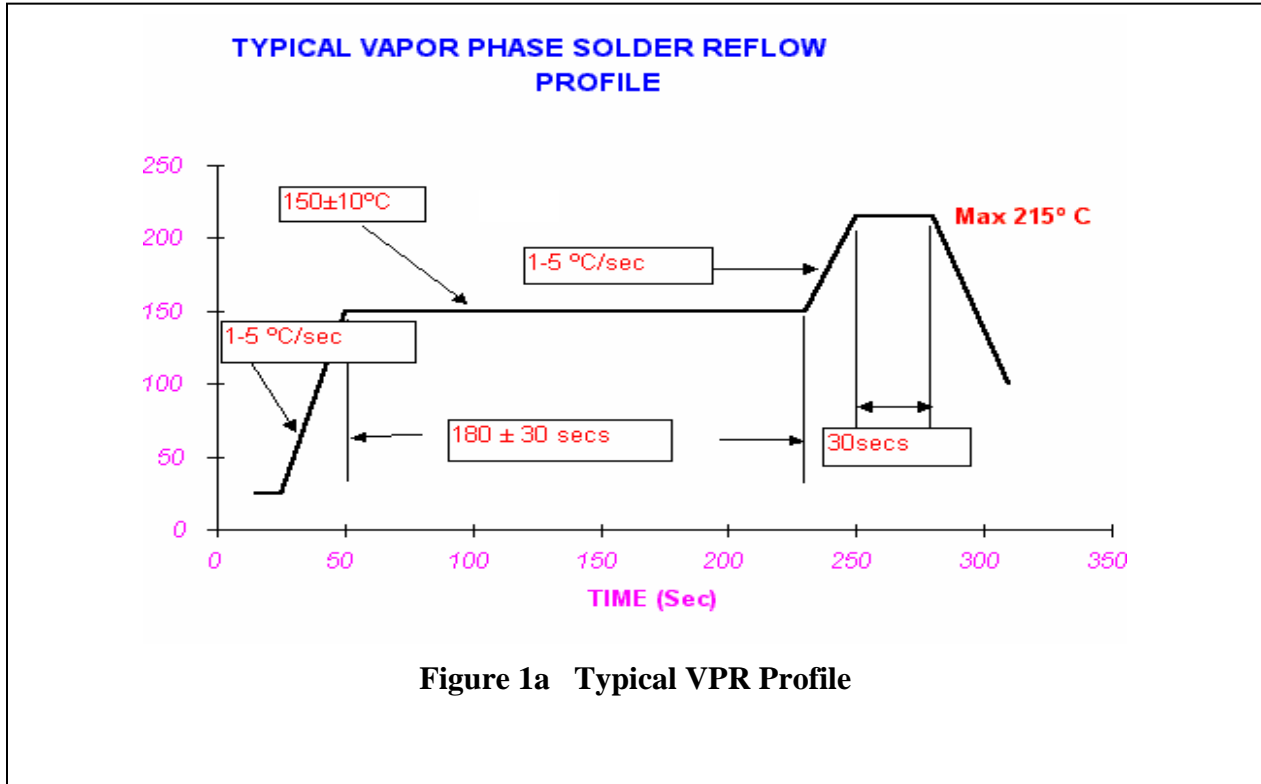
No. Device storage shall remain the same as the Sn/Pb package if the same reflow profile is used for both standard and Pb-free products. MSL rating for some packages may be downgraded if the peak reflow temperature exceeds 250°C. Please refer to the [Exar Application Guide](#) for more details.

16. Will Exar issue PCNs for Pb-free products?

Exar will issue PCNs for Pb-based (Sn/Pb) products when they are replaced by Pb-free. 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 Exar done on Pb-free products?  
Reliability tests include temperature cycles, temperature humidity, high temp. storage, solderability and tin whisker testing. Reliability information is available upon request through your local Exar sales representative. Board-level reliability tests are conducted by Exar assembly suppliers.
18. Will Pb-free products maintain the same moisture sensitivity level (MSL) as with Sn/Pb packages?  
MSL rating for some packages may be downgraded if the peak reflow temperature exceeds 250°C. Please refer to the [Exar Application Guide](#) for more details.
19. Are Exar Pb-free products usable for both Pb-free and Pb-based manufacturing environments?  
Exar 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 Exar are qualified as backward compatible while Pb-free BGA's are in general considered to be not backward compatible. It is suggested that each customer evaluate and confirm Pb-free BGAs backward compatibility based on his individual PCB assembly process and application.
20. What Pb-free packages from Exar are backward compatible?  
Pb-free lead-frame packages from Exar are backward compatible.
21. Does Exar have a recommended reflow profile?  
The reflow profile should be optimized according to the user's board density, board size, etc. Exar provides guidelines for a reflow profile and it can be found in the [Exar Application Guide](#), available upon request from Exar sales representative or distribution partner.
22. Where can I go for more information about the Exar Pb-free program?  
For the latest information regarding Pb-free products, contact your Exar sales representative or distribution partner.



**Note:** For typical Pb-free reflow profile, add 15°C to VPR peak-temp and 20°C to IR/convection peak temperature; also, raise preheat temperature by 5°C.

*MSL of Exar Packages (subject to change based on rel data update)*

<b>Package</b>	<b>Package Configuration</b>	<b>Sn-Pb/ Pb free</b>
JEDEC SOIC/SOJ/QSOP	.150", 16ld(.300")	1
JEDEC SOIC	.300" >16lds	1
EIAJ SOP	4.4, 5.3, 5.4, 7.8, 8.4mm	1
SSOP	5.3mm	1
TSSOP	4.4mm	1
PLCC	20, 28, 44lds	1
	52, 68, 84lds	1
QFP	10x10mm	1
	>10x10mm	2a
LQFP (1.4mm thick)	7x7mm	1
	>7x7mm	2a
	>20x20 mm	4
TQFP (1.0mm thick)	7x7mm	1
	>7x7mm	2a
	>20x20 mm	4
Leaded TEP	All	4
BGA	All	4
QFN	< or =5x5mm	1

- Note:**
- 1) The package MSL depends on material, process, die, lead frame, and the actual MSL test conditions. The above table is for general reference only based on Exar's latest reliability test data.
  - 2) Max reflow peak temperatures are per latest Jedec STD 020.
  - 3) Thermal enhancements for TEP include attached heat slug, drop-in heat spreader, exposed pad, and etc.

*Dry-Pack MSL Labeling*

Exar realizes that not all end users or PCB assemblers are able to operate under the environmental conditions with maximum temperature and humidity as defined in Jedec MSL classification. To compensate for possible excessive out-of-standard storage or floor condition, Exar considers that it is appropriate to reduce MSL by one level for dry- pack labeling in order to preserve adequate safety margin. This also covers those lot-to-lot variations in materials, processes, and the statistical uncertainty in the sampling reliability testing. Please refer to the MSL table in the last section for a comparison.