RoHS Compliant

We are currently producing both Prototype and Production PCB's that meet the RoHS Directive. To reach that goal it is important that our circuit boards not only be lead free but also meet the restricted concentration levels for mercury, cadmium, hexavalent chromium, polybrominated biphenyls and polybrominated diphenyl ethers. We are using raw materials and processes that enable us to meet those restrictions.

It is not PCB Express intent to replace our tin lead solder process at this time. It will continue to run in tandem with the lead free process until the use of leaded solder becomes untenable.

Currently any printed circuit board that we produce does not contain any mercury, cadmium, hexavalent chromium, polybrominated biphenyls or polybrominated diphenyl ethers. Boards we produce that are not processed using leaded solder for a final finish will meet all of the RoHS' restrictions. These products would include those that have lead free solder, electro less nickel immersion gold, electroplated gold, immersion tin or finishes other than tin-lead solder.

Key Questions to ask yourself when buying a lead free board:

What temperatures and duration does the laminate need to withstand in order to survive lead free processing?

Before placing a printed circuit board order, buyers should know the maximum temperature and maximum time their assembly process requires. This information will depend on your solder process and your lead free alloy processing temperature. The time is accumulative, so if you wave solder a part for 5 seconds, reflow it for 8 seconds and then rework it for another 5 seconds you will have a total of an 18 second excursion. Temperature thresholds typically being referenced are T-260 and T-288 ratings. These are the times it would take for a sample to delaminate at either 260° or 288° C constant temperature.

What are the Dielectric and Impedance values of the printed circuit board design?

Boards designed for specific dielectric attributes of most FR4 laminates may not function correctly when placed on higher thermal capacity materials. It is important to understand the function of the board and that a laminate or a final finish change could alter the designer’s intent. As an example, a typical mid range Tg laminate has a Dk of 4.25 at 1GHz while a high temp material from the same manufacturer is at 4.6. The Df ranges from 0.016 to 0.023 on the higher thermal capacity material. If you have questions about the direction to go, consultation with the designer is a must.

What final finish is desired?

There are a number of options – often the choice will be dictated by the printed circuit board designer, however when the opportunity arises to choose a finish you must be aware of the issues surrounding each.

	HASL (SnPb)	HASL Lead-Free	ENIG - electroless nickel immersion gold	Immersion Tin (Sn)	Electrolytic nickel Gold - NiAu
RoHS Compliant	no	yes	yes	yes	yes
Shelf Life	12 months	12 months	12 months	9-12 months*	12 months
Assembly Cycle Capacity	multiple	multiple	multiple	multiple	multiple
Solder Wettability	excellent	good	good	good	good
Solder Joint Integrity	excellent	good	good	good	Poor **
Aluminium wire bond	no	no	no	no	Yes

* See storage conditions

** thicker deposit of Au can cause embrittlement

Storage Conditions for PCBs processed with Chemical Tin surface finish
Preferred conditions of storage: **Temperature: 20 +/- 5 ° C, Relative humidity: 45 +/- 15%**

Storage Conditions and Product Handling at Assembly

- The product should be stored in the sealed airtight packages until assembly occurs.
- When handling the product, gloves should be worn and contact with the metalized /plated areas must be avoided.
- Once the vacuum package is opened, the following conditions shall be maintained:
  a) Relative Humidity < 50%, Temperature 20 – 25 °C,
  b) Assembly must occur within one week
  c) PCBs shall not be exposed to corrosive gas or liquid environment
  d) PCBs shall not be exposed to direct sun light
  e) Fingerprints must be avoided
- Opened packages may be kept for a maximum of one week if they are stored slip-sheeted and stacked, (i.e. not in racks).

In general PCB product should be stored in the vacuum sealed airtight packages until assembly occurs.

The chart above is a simple quick reference - there are a number of factors that may make one finish better for a particular part number or assembly operation.

What additional information should be added to fabrication documentation to ensure that the boards will come back RoHS compliant?

- Require a “manufacture/fabricate to meet the EU RoHS Directive”.
- State the type of material you need using the IPC-4101 spec sheets and list any tolerances you expect the material to meet.
- List a preferred laminate by manufacturer & name and add “or equivalent”

The same requirements should be added to your purchase order.

Are there any special layout concerns (spacing, etc.) when designing RoHS compliant printed circuit boards?

No, unless you have impedance requirements that might change depending on the materials used.

What cost increase can be expected between “standard” and RoHS printed circuit boards?

We are providing our lead-free solder finish at no additional charge to our customers. There are, however, increased price differentials associated with the higher temp laminates required by some lead-free component assembly as well as other final plating finishes.

Is there a special marking on the boards that would indicate RoHS compliance?
We will not be using any lead-free symbols on the bare boards. Both IPC and JEDEC standards for marking, symbols and labels for identification of lead free assemblies, components and devices do not call for board level markings. However, you will see the Lead-Free label on the packed PCB stacks.

RoHS Links & Articles

www.zvei.org.
http://www.fed.de
IPC's Lead Free Website
Surface Mount Technology Association
International Electronics Manufacturing Initiative
Toxic Use Reduction Institute
JEDEC
National Center for Manufacturing Sciences
Pb-Free