

RoHS Compliant vs. RoHS Compatible



Abstract

The desire to reduce pollution within our environment has led to the RoHS directive (July 1, 2006) in the EU that restricts the use of certain hazardous substances in electrical & electronic equipment. Since that time, this environmental standard has spread to other parts of the world. These are the early days of RoHS, and it is not a simple matter to say let's switch our products to RoHS. As a designer or an executive involved in decisions to move to RoHS, it is important to understand the complexity of this decision. Many individuals believe that converting to RoHS is just a matter of selecting RoHS components and manufacturing with lead-free solder. The issue is that many parts may be RoHS compliant, but they cannot handle the more extreme RoHS manufacturing process. This article is intended to clarify what it means for a component to be RoHS compliant versus being RoHS compatible.

RoHS compliant means that the component does not contain six hazardous substances: lead, mercury, cadmium, hexavalent chromium, PBB, & PBDE. In selecting alternate materials to plate the leads, component manufacturers will look at characteristics such as solderability and resistance to whiskers. It does not mean that these parts are compatible with the manufacturing process.

RoHS compatible means that the component can handle the higher solder temperatures used in RoHS board assembly. RoHS manufacturing requires at least 30° C higher soldering temperatures than Tin-Lead to ensure reliable connections between the board and components. Also, since lead-free solders have poorer wettability, the components and PCB are held at this higher temperature for much longer time than tin-lead solders. The issue is that some RoHS compliant components cannot handle these elevated temperatures.

What issues can arise from this higher process temperature? John Barnes gives a good summary of some of these issues (Source: <http://www.dbicorporation.com/rohs.htm>):

- Liquid-containing components, such as aluminum electrolytic capacitors, blowing apart, bulging, or blowing electrolyte out their seals.
- Large ceramic components, such as resistors, capacitors, and inductors, cracking because the components shrink more than the PCB does as the assembled board cools down from the solidus temperature of the solder.
- "Popcorning"-- delaminating or cracking of components-- when moisture absorbed by the plastic package turns to steam.
- Components warping, if we approach the plastic's softening temperature.
- Degrading the plastic, if we approach its degradation temperature Td.
- Breaking or weakening bonds inside the component, from differential expansion/contraction between conductors and the surrounding insulators, if we exceed the Glass Transition Temperature Tg of the plastic.

Summary

At New Age Technologies, we know how to solve these issues through careful component selection, selected manufacturing techniques, and Design for Manufacturing (DFM). Because RoHS is so early in its development, it is critical that designs are evaluated for manufacturability, and that you select manufacturing partners with extensive materials expertise. DFM is included as part of our services because it can have a major impact on the quality &/or manufacturability of the product.

As RoHS matures, we expect the distinction between RoHS “Compliant” & RoHS “Compatible” components to become less of an issue. In the meantime, careful selection of components, processes, and partners will help make your RoHS project successful.

If you would like to discuss these issues further, please contact: D@NewAgeEMS.com