



Deciphering Pb-free labeling of integrated circuits

Part numbering systems vary and some manufacturers only mark the outer box

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Labeling of Pb-free components is a critical part of any RoHS project. Two forms bear looking at—part and box marking.

Many, but not all, semiconductor manufacturers have opted to uniquely identify their components with suffixed part numbers to differentiate the Pb-free products from the leaded. While some manufacturers have opted to rely on date coding, the majority of suppliers have added a letter to the original part number.

For example, ON Semiconductor has added a G-suffix to the end of the part number for every Pb-free RoHS-compliant product. Both the part numbers and marking of the packages are changed. The identifier on the package (either the distinguishing part number or a micro dot as shown in Fig. 1) allows the end user to easily inspect for compliance. Vision systems on pick-and-place machines can be programmed to look for the unique marking.

Labeling requirements of JEDEC

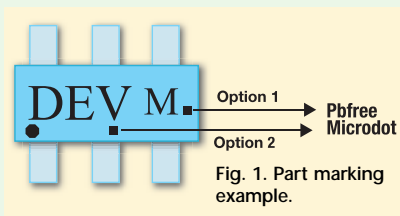


Fig. 1. Part marking example.

standard JESD97 (Marking, symbols, and labels for identification of lead-free assemblies, components, and devices) specify labels on both intermediate and outer boxes that clearly

show whether the products inside are RoHS compliant/Pb-free. The label (see Figs. 2 and 3) shows the part number with the unique Pb-free character (the “G” for ON Semiconductor), and the Pb-free symbol.

The label also shows that the part has been qualified at a 260°C reflow temperature and that it has passed qualification for moisture sensitivity level (MSL) 1. The MSL rating is very important, as it informs the user of any special handling required.

A MSL level of 1 generally means the parts can remain on the shelf in-



Fig. 2. The “2LI” stands for “second-level interconnect” and officially signifies the lead finish is Pb free.

definitely without worrying about production problems, while a lower level of 3 means the parts must be vacuum packed and can only be out of this packaging for a limited time. Often the MSL level drops for Pb-free ICs because the higher reflow temperature of ~260°C demands greater moisture resistance.

As shown in Fig. 2, the “2LI” stands for “second-level interconnect” and indicates the Pb-free symbol is for the exterior lead assembly and not internal chip interconnect.

The label example in Fig. 3 shows a product that has been qualified as Pb-free and for 260°C soldering with a MSL rating of 3. This product has a limited unsealed “shelf life” and proper handling is required after the vacuum package



Fig. 3. A label example shows a product that has been qualified as Pb-free and for 260°C soldering with a MSL rating of 3.

has been opened.

Many end users are requesting information regarding the material composition of the lead finish. They not only want confirmation that the product is RoHS compliant, but also want to know what plating finish material was used on the product—which can affect the soldering process. The Pb-free lead plating options codes, which may be shown on labels, as defined by JEDEC JESD97 includes the following:

- e1. SnAgCu
- e2. Sn alloys with no Bi or Zn excluding SnAgCu
- e3. Sn
- e4. Preplated (e.g., Ag, Au, NiPd, NiPdAu)
- e5. SnZn, SnZnx (no Bi)
- e6. Contains Bi
- e7. Low-temperature solder 150°C containing indium (no Bi)

These categories enable end users to readily define the devices finish without having to refer to other paper work. Providing this information as well as the unique part number, label Pb-free symbols, and qualification results assists in the conversion to RoHS compliance. A major part of any manufacturer’s RoHS/Pb-free program must be an acute awareness of their each of there supplier’s part and box labeling standards. ■

ONSemi rohs 11/05

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Comments

Needs additional
corrections

AAs

Final—ready for pdf