

Roadmap to Compliance of the EU's RoHS and WEEE Directives

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The upcoming EU RoHS and WEEE Directive's deadlines are driving new requirements across the electronics manufacturing value chain and the product life cycle. The Restriction of Certain Hazardous Substances (RoHS) in Electrical and Electronic Equipment bans the use of substances such as Pb, Hg, Cd, Cr, polybrominated biphenyls (PBBs), and polybrominated diphenyl ethers (PBDEs). Products sold into EU states (25 countries) after July 1, 2006, will have to comply with established threshold values. The Waste from Electrical and Electronic Equipment (WEEE) regulation places strict requirements on the disposition of electronic products at their end of life. WEEE is set to go into effect on August 13, 2005.

RoHS Compliance & Lead-free Device Marking

To clearly state our intentions concerning RoHS compliancy, National will soon release a product change notification (PCN) describing our transition from SnPb to lead-free. The PCN states that we will provide fully RoHS-compliant parts for all devices by the end of June 2006. All of our Pb-free parts are currently RoHS-compliant. We will continue to offer SnPb-plated products to support customers with applications that are exempt from known legislation. The PCN will be available on our website under the "green compliance" link.

New device IDs will not be defined. Instead, during the transition period, which begins in June 2005 and will last approximately 12 months, SnPb parts will be ordered with Flow **PB**. Lead-free parts will be ordered with Flow **NOPB**. At the completion of this period, lead-free devices will be

ordered using the device ID only, whereas SnPb parts will continue to be ordered with Flow **PB**. At this time, there is no defined date for full obsolescence of SnPb parts.

This strategy of keeping the same device ID has met with acceptance among certain customers, while others have expressed an equally strong desire for new device IDs. We provide for traceability by assigning die run codes beginning with RA – ZZ for all lead-free products. This code is then marked as the last 2 characters in the first line of the device mark. PB-FREE also appears on the label of the lowest-level shipping container.

During the transition, National will adopt JEDEC's JESD97 to identify the type of lead-free plating. This identifier (e1, e2, etc.) will be printed on the labels and, if space permits, will be marked on the components.

Exchanging information on material composition with OEMs still needs to be sorted, due to the lack of an industry standard on data content and format. Although the draft of IEC 3/750/DPAS outlines the high-level requirements for the materials declarations, no standard exists yet for use across the supply chain. The proposed IPC-1752 would be aligned with RosettaNet 2A10/2A13.

Whiskers

Tin whiskers are an increasing concern because the majority of lead-free packages in the industry are matte tin plated. The whisker growth propensity and incubation period depend on the base metal composition, the plating thickness, and the plating grain structure. The grain structure, in turn, depends on the plating bath chemistry and conditions. Thus, much effort has been devoted to op-

timization of the plating bath. In addition, the industry has identified a post plate annealing process that mitigates whisker growth by affecting the structure of the intermetallic between the base metal and the lead finish. National instituted a 1-hr. post plate bake at 150°C within 24 hrs. of plating for all matte tin components. Since thin plating is known to be more susceptible to whisker growth than thick plating, a minimum plating thickness of 8 µm is maintained, with a nominal of 12 µm.

For whisker testing, National adopted the 2003 iNEMI proposal, including the following three conditions, run independently: (1) ambient, (2) 60°C/93% RH, and (3) -55/85°C TMCL. The results, taken on 4 different leadframe metals, can be seen on the "tin whiskers" link on our lead-free website: (http://www.national.com/packaging/leadfree/tin_whiskers.html). Since that time, JEDEC has developed a test method that is based largely on the iNEMI proposal. This JEDEC test method passed ballot (#JC-14-04-226A), and will be released in mid-2005.

Because of customer concerns related to matte tin, we are currently qualifying NiPdAu pre-plated frames for different package families. Special emphasis has been put on wire bonding, lead forming (to check for lead finish cracks), plating quality after handling and processing, effect on moisture sensitivity level (MSL) performance, and solderability.

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