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Reliability of Tin/Copper/Nickel Lead-Free Wave Soldering

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With the conversion to lead free soldering in full swing now, one of the most important concerns is the reliability of the lead free assembly. Lead free alloys are relatively new in electronics applications and the concern is long-term reliability. A large number of tests have been performed in the last 10 years to determine if lead free could be considered as reliable as the tin/lead alloys that have been utilized for the past 50 plus years in electronic assembly. Understanding the differences in the assembly process and technical requirements for converting to lead free is critical to the successful implementation of this new process. This paper has been developed to give a brief overview of the tin/copper/nickel lead free wave solder production process with an emphasis on its affect on reliability of the resulting assembly. Lead Free assembly has been in production in Asia for the last 7 years and much has been learned about the conversion from tin/lead to lead free. This paper will discuss the factors that affect reliability of lead free wave soldering and include copper erosion tests, machine compatibility, vibration testing, and thermal cycling testing.