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Lead-Free Solder Joints Testing for Reliability Studies

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Abstract
A nowadays technological requirement is replacing the current soldering technology based on lead containing solder alloys with other solder alloys without this metal, in accordance with the EU's RoHS Directive (finally agreed at world level). The solder alloy under investigation is a SnAgCu type, with three variants of PCB surface finishing as follows: copper, gold and HAL (Hot Air Solder Leveling). The devices subjected to the testing program where processed in two locations, as follows: an industrial process facility and a research laboratory. The DUT's where subjected to three types of tests: (i) Thermal cycling at -550C / +1250C / 30 minutes at each step; (ii) Cycling damp heat at -400C / 850C and 85%RH / 30 minutes at each step; (iii) mechanical stimulus superposed on climatically stress (cycling dump heat). The paper describes the tests and the appropriate fixtures designed and realized for a proper execution of all those tests. The results obtained so far are clearly tip the balance in favor of the HAL variant which assures a higher reliability level for both fabrication processes (industrial and laboratory).

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