

Improving the Processability of Noble Metal Component Termination Finishes

Martin Wickham, Milos Dusek, Christopher Hunt & Ling Zou

Centre for Materials Measurement & Technology
National Physical Laboratory
Teddington, Middlesex, UK, TW11 0LW

ABSTRACT

This project aimed to benchmark the processability of new lead-free plating chemistries. The project partners were National Physical Laboratory, leadframe plating chemistry suppliers and a component manufacturer. The project evaluated nine alternatives to tin/lead component finishes, bench-marked against one conventional tin/lead finish. The types of finish, all lead-free, were variants of palladium on nickel, gold on nickel and gold on palladium on nickel. The techniques used to compare the finishes included Auger electron spectroscopy, scanning electron microscopy, wire bond pull testing, solderability testing, moisture ingress measurements, process yield evaluation and solder joint shear testing.

None of the alternative finishes evaluated could be considered a direct 'drop-in' replacement for SnPb although some compared closely in a number of aspects. The majority of the finishes exhibited lower moisture ingress than the SnPb control and AuNi finishes showed comparable process yield results and as-received solderability results as the SnPb. Only one of the PdNi finishes had a process yield close to that of SnPb. The solderability of some of the finishes was adversely affected by cracking of the plating in the heel region. None of the finishes performed as well as SnPb in solderability testing after ageing for 16 days at 155°C.

The wirebond pull strengths of PdNi finishes were generally below those of Au-finished leadframes but still of acceptable values.

Solderability testing of aged samples was also undertaken with Pb-free alloys (SnAg, SnAgCu, SnAgCuSb). SnPb finished leadframes out-performed all the alternative leadframes with all the Pb-free alloys. The alternative leadframes also performed better with SnPb solder than with any of the Pb-free alloys.

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Teddington, Middlesex, UK, TW11 0LW

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Approved on behalf of Managing Director, NPL, by Dr C Lea,
Head, Centre for Materials Measurement and Technology

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