PRECIOUS AND REFINED: THE IMMERSION NICKEL GOLD PCBS

APPLICATION AREAS

Immersion nickel gold process has long been an established surface refining process among printed circuit board techniques. However, in spite of many advantages over conventional solder levelling it has only been adopted for certain application areas.

Nickel gold is utilized in particular where PCB surfaces are exposed to aggressive environments, for instance in mobile phones, or automobile electronics. Due to the consistent chemical precipitation of metal, gold is the obvious choice for all fine-pitch assemblings with under 0,5 mm grid spaces. Due to its smooth excellence, the immersion nickel gold surface is a better alternative to HAL, particularly for narrow SMD grids on both side of PCB`s.

The actual wiring of a component is effected by means of a 4-6 my thick layer of nickel, and not by means of the extremely fine 0,05 to 0,2 my layer of gold which merely serves as an oxidation and diffusion blockage in order to extend the soldering conditions. Thicker gold layers, up to 0,3 my, are only targeted for thermosonic wire bondings using gold wire.

PROCEDURES AND PROCESSES

Not only the expense of the material makes a high gold plating undesirable; the problem of soldering bath pollution is also a reason for as thin a coating as possible. It is not only the use of a precious metal, gold, which increases the price but especially the processing costs. The number of machine hours alone is far higher than for solder levelling as the facilities required are similarly complex to those for galvanization, which additionally require a complex waste water processing infrastructure.

The immersion nickel gold process also requires staff intensive attention as the chemical baths call for a great deal of analysis and supervision due to the narrow processing slit. The process of solder mask coating as well as de-oxidation of bare copper surfaces (activation) must perfectly match the gold plating.

To prevent the risk of poor metallic deposition on the gold surface, vias must be completely free of solder mask coating or be completely closed by means of a special filling process. Curing of the solder mask coating must also concur with that of the chemical gold plating as it is exposed to hydrogen in the 90° C nickel baths.

One has the choice between an expensive coating system or a subsequent infrared solidification which, in turn, also calls for further investment in facilities.

THE POTENTIAL

For a lead free altenative provided the PCB manufacturer ensures optimal conditions for immersion nickel gold coating, the results of wave soldering are equally good to solder levelling. Good storage ability is also achieved by covering the pad and smd sides with gold. In our opinion, however, immersion nickel / gold will never become an established alternative to HAL.

As already mentioned, the processing costs are the greatest handicap for this method. However, due to the lack of other alternatives in the lead-free future immersion nickel / gold will retain its position in the area of fine pitch and COB applications. Cost disadvantages of the immersion nickel / gold process could be balanced, in particular in the production of large series (consumer goods), if the use of chip-on-board is considered.

It is often worth purchasing “bare” chips and connecting them directly to the PCB with bonding wire. The amount saved on the chip casing could then pay off.

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