IMMERSION TIN – ETERNAL PRINTED CIRCUIT BOARD FAVOURITE

The procurement of PCBs often leads to the question as to which surface protection is the right one. This is partly due to the changing technical demands on PCBs in further processing. Also, as of 1. 6. 2006, EU-Regulations restricting the use of dangerous materials in electronic appliances are to include the prohibition of materials containing lead, and is, therefore, another reason why alternative surfaces have been developed. One of these is immersion tin.

PROCEDURE

A layer of tin is applied to the PCB by means of a special process, in which the copper atoms of the exposed conductors and contact areas are exchanged for tin atoms by adding thiourea. The chemical reaction ends when the copper surface is 0,6 to 1,2 my. Between the tin and copper layers there is an inter-metallic copper-tin phase after this process, i.e. blended metal.

There are a number of reasons in favour of applying tin chemically. One advantage is the uniform smoothness of the surface. This feature enables the application of fine pitch components with a <0,5 grid. Such a fine grid sorely tests the limits of classical lead-tin surfaces (SnPb), especially when Fine-Pitch technology is necessary on both sides of the PCB.

CHARACTERISTICS

We can expect PCBs to require a combination of assembling technologies in the future. Immersion tin could also satisfy the demands of such a development. Components can be stuck to the PCB as well as soldered. Immersion tin demonstrates a good soldering ability, but is slightly at a disadvantage compared with SnPb, because the thin immersion tin layer cannot be completely dissolved. Multi-soldering is possible, as well as pressing techniques, thanks to the thinness of the layer.

The thin tin layer does, however, has its disadvantages. The inter-metallic copper-tin phase is approx. 0,25-mµ thick when delivered. During storage, the diffusion of copper in the tin surface continues, causing the thickness of the pure copper or tin layers to decrease. If the blended metal reaches the surface it becomes coated with a non-removable oxide, making soldering impossible. Storage possibilities of immersion tin PCBs are, for this reason, considerably limited compared with conventional SnPb techniques: stored PCBs should be used up within 3 months and if time exceeds 6 months, heavy processing problems can occur.

The melting temperatures are markedly higher compared with SnPb, therefore the assembling process for many components takes place at the absolute limits of acceptance. As a result, component losses must be expected when assembled.

The price of immersion tin is between that of the classical SnPb and the immersion nickel gold surfaces. However, thiourea, which is used in the production, does not conform with environmental or effluent requirements, therefore the future costs for disposing of wastes are difficult to calculate, particularly in view of the upcoming, stricter environmental regulations.

CONCLUSION

Immersion tin can be seen as a viable alternative, as the surface offers many advantages under the conditions described. The costs are also slightly lower than Immersion Nickel Gold. However, until lead is prohibited, immersion tin will never be able to completely replace the old lead tin. In many cases SnPb perfectly satisfies the assembling requirements and offers definite cost advantages, provided that environmental costs do not increase.

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DIN EN ISO
9001 : 2000
Certificate-No:
05124-1 / 2005