ELECTRICAL CONNECTION PADS WITH IMPROVED SOLDERABILITY

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HINTERGRUND

The most common metallic materials used in the printed circuit board (PCB) technology are copper and brass. Due to their high chemical reactivity, these metals quickly form a thin passivation layer under the influence of air. This significantly decreases the solderability and limits the shelf life of PCBs. Hence, the PCBs are necessarily pre-processed (e.g. gold-plated, additionally coated, chemically cleaned). That makes them more expensive and increases the complexity of the electronic component assembly process.

LÖSUNG

The innovation describes a selective laser treatment and functionalization of the PCB surface. By applying ultrashort pulsed laser light to the solder pads, their surface chemistry and morphology is modified in such a way that the wettability of the solder surface is improved. The laser treatment creates a nearly periodic surface structure in the nanometer range and hence enlarges the wettable surface area while simultaneously removing the above-mentioned passivation layer. The created nano-structure is visible to the naked eye and makes process control very easy.

Figure left: Comparison between 3 surfaces. (I) Polished Cu with a storage time of 14 days. (II) Polished and laser structured Cu surface stored for 14 days under...
lab conditions. (III) Oxidized surface with a „fresh“ laser treatment directly before the solder test. Figure right: Easy process control thanks to the colourful interference effects when light is reflected on the surface of the structured solder pads.

ANWENDUNGSBEREICHE

- Applicable to almost any connection pad material.
- Applicable to modern multilayer PCBs, due to minimal material removal.
- Simultaneous changes to the surface chemistry, morphology and surface area.
- Improved wettability enables lead-free solder (RoHS compliant).
- Laser can be used for additional in line process steps like cutting or via drilling.
- Further applicable to improve surface adhesion for bonding or gluing processes.