

Multifunctional 3D Packages for Microsystems

Laser Technologies for Finest Pitches on MID

Polymer based multifunctional 3D packages made by MID (Molded Interconnect Devices) technology combine miniaturization and high functionality. Laser technologies are well suited for patterning fine conductor lines on 3D parts for assembling SMD and bare die. Furthermore layout changes can be performed easily. With the fully additive LPKF-LDS® process as well as with the semi additive patterning process also free-forming 3D surfaces can be patterned.

For the LPKF-LDS® process the plastic part is made by injection molding of a polymer with special additives. Different solderable thermoplastics as e.g. LCP, PBT/PET, PEEK and PA6/6T are commercial available.

The LDS process starts with a selective activation of the 3D polymer surface with an infrared laser beam. The activated areas are metallized by electroless plating with Cu/Ni/Au. Also alternative layer systems like Cu/Ag or Cu/Pd/Au are available. At present, with the LPKF-LDS® process metal line pitches of 200 µm can be obtained in serial production. For special applications ultrafine metal line pitches down to 70 µm are feasible using a newly developed LCP material and a fine focused laser system.

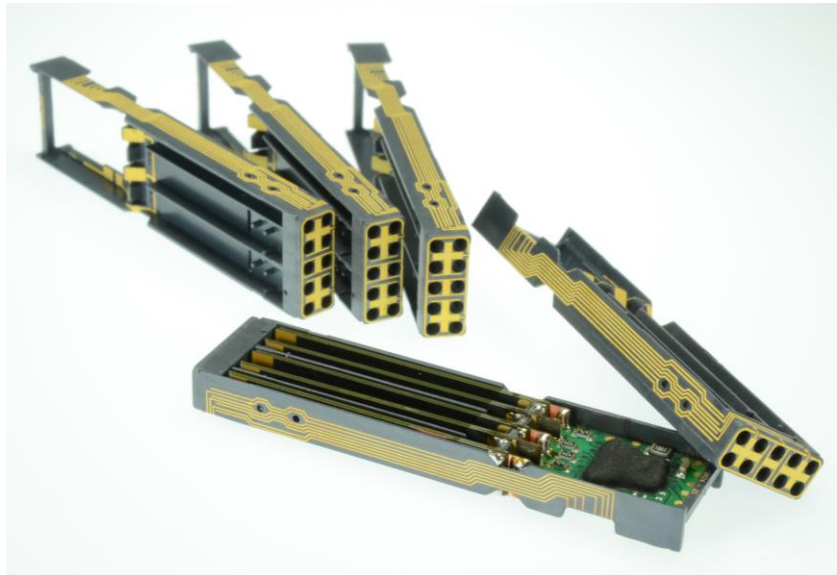


Fig. 1: Three-dimensional conductor lines on modules for a Braille display

Key features

- Miniaturisation
- 3D design freedom
- Integration of additional functions
- Reduction of number of components and reduction of process / tolerance chain

Within the same process also micro vias are feasible. The laser beam is used for drilling the holes in the plastic part. While drilling the holes, the side walls are activated for electroless plating.

Using the semi additive process a thin metal starting layer has to be selectively removed from the completely plated plastic part by

Fields of application

- Automotive industry
- Automation
- Medical technology
- Information and communication technology

laser ablation with a fine focused ultrashort pulse laser. The starting layer can be deposited by electroless plating or physical vapour deposition as well. After laser patterning electroless plating of nickel and gold is carried out. As the whole surface of the plastic device is coated by metal, the semi additive technology is well suited for devices with integrated shielding.