

## Laser Via Drilling

As modern electronics devices are designed with higher component and trace densities, microvias are becoming both common and progressively smaller. Once via holes reach about 150  $\mu\text{m}$  (0.006") in diameter, mechanical drill bits are easily broken, adding to manufacturing costs. Laser drilling has become the preferred fabrication method for microvias as the beam can be focused to a very small size, positioned precisely on the panel, and without the requirement of hard tooling.

Using both UV and CO<sub>2</sub> lasers, the largest range of materials can be processed. UV lasers are used to create openings of the correct size and location in the top copper layer. This opening becomes a conformal mask for the CO<sub>2</sub> spot which is sized to flood the hole with light. The exposed dielectric is removed without damage to the top copper or the copper at the bottom of the via.

Modern, well-designed drilling systems include adequate monitoring and self-calibration features to ensure reliable, accurate, consistent results even through hours of unattended operation.

Vias that are covered by subsequent lamination of another layer are called buried vias. The laser's precision also enables the stacking of blind vias in a multilayer board using a layer-by-layer process. Vias are stacked on top of each other to form a longer, solid via through multiple board layers. Tight specifications are needed to ensure there is no lateral displacement in successive layers which would ruin alignment between vias above and below. Alternatively, vias on adjacent layers can be intentionally offset from each other, forming a staggered set of vias.

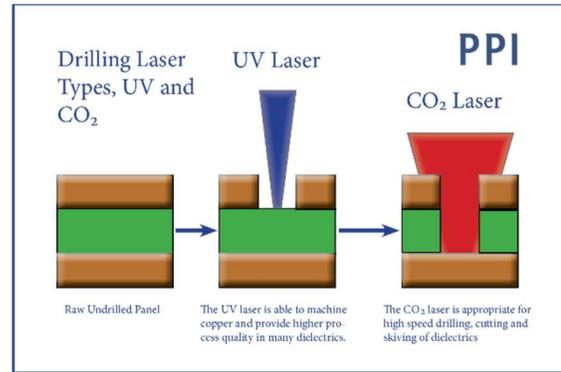
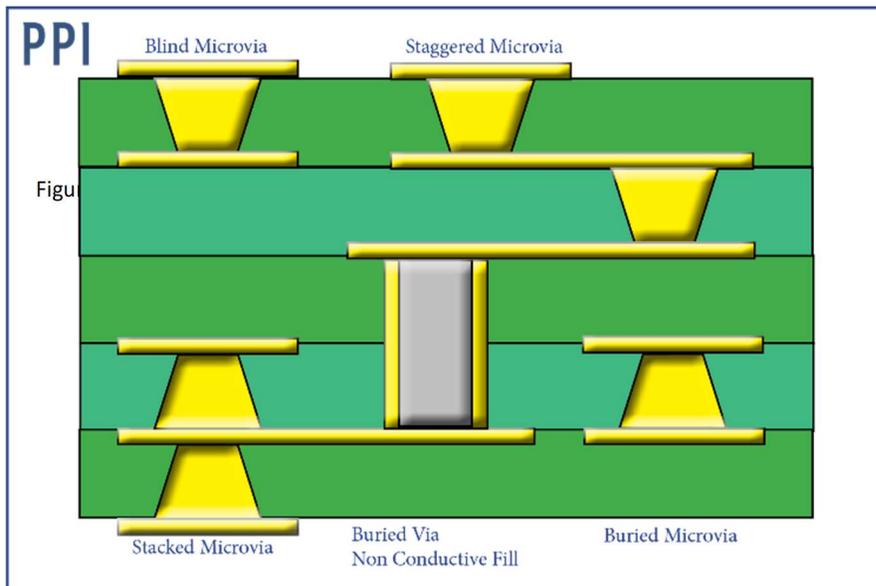


Figure 1: Drilling Laser Types



Blind vias connect an outer layer to one or more inner layers but will not pass through the entire board. In addition, they are only visible from one outer layer. Buried vias on the other hand connect two or more inner layers but do not protrude to the outer layer and are not visible from any outer layer. Microvias that pass through a layer without making electrical contact are called skipvias.