

Mechanical and Laser Machining in One System
LPKF ProtoMat D104





Uniting the Laser and Circuit Board Plotter

LPKF ProtoMats can be found in many R&D departments around the world. They enable in-house mechanical machining of PCB substrates to rapidly produce production-quality circuit board prototypes. This product family now includes the LPKF ProtoMat D104, which features an integrated high-precision UV laser.

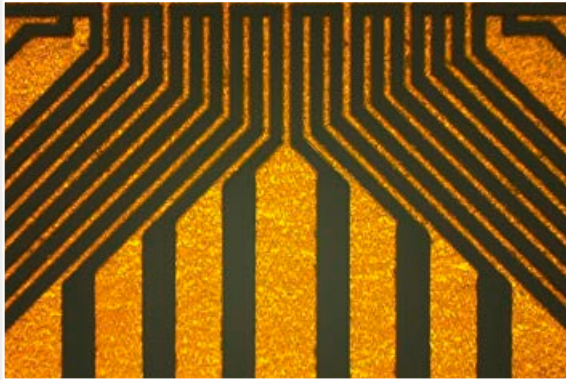
Multi-Functional and High-Performing

Performing chemical-free production of high-quality circuit boards in R&D departments has clear advantages for shortening time-to-market for new products. Circuit board plotters generate complex circuitry on metal-coated base material through insulation channels, separating conductive traces from the base material with various tools such as end mills and v-shaped tools. The LPKF ProtoMat D104 has perfected this functionality, featuring spindle speeds of up to 100 000 rpm, a 15 position automatic tool-selector, and repeatability of 1 μm .

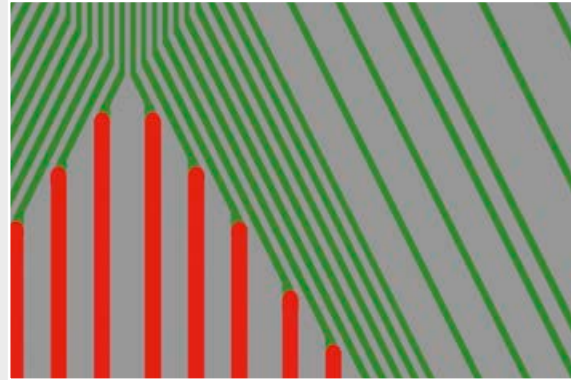
The ProtoMat D104's integrated UV laser separates itself from traditional milling machines by extending the range of possible applications. With a beam spot size of just 15 μm , PCB track widths of 50 μm and spaces of 15 μm can be achieved. An intelligent control system and advanced CircuitPro software determine independently when either the precise laser or the faster mechanical tools should be used – depending on the board layout.

- 15 mechanical tools and a precise UV laser
- Non-contact tool setting
- Non-contact working depth limiter
- Integrated fiducial camera/vision system

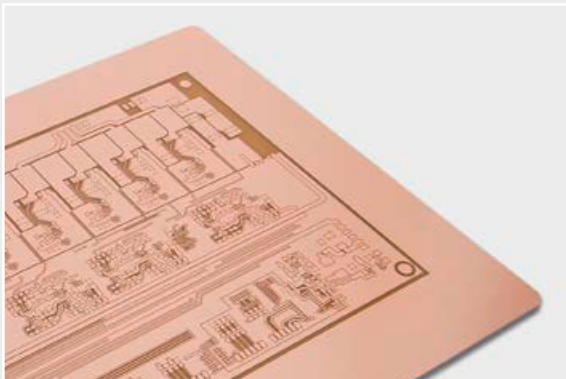
Applications



Circuit structuring on FR4 with the laser (down to 50 μm traces/15 μm spaces) and milling tools (down to 100 μm traces/100 μm spaces)



Circuit layout as displayed in CircuitPro – green lines represent laser processing, red lines represent mechanical processing



Laminate structuring to precisely create the planned tracks and pad surfaces



Structuring on Al_2O_3 with Cu/Au plating using the laser (50 μm traces/25 μm spaces)

Greater Functionality under the Hood

The ProtoMat D104 comes with a new product design that makes maintenance easier. The hood over the work area ensures safe operation with laser class I and improves suctioning.

In addition, tool setting and limitation of the working depth for mechanical work steps are achieved in a non-contact manner. A vacuum table holds the substrate securely in place while a vision system enables the material position to be read and the structuring results to be measured.

The ProtoMat D104 combines the best of two worlds. It adds new machining options such as depaneling of flex and rigid-flex boards and machining of fired ceramics, as well as the precise geometries with straight side walls required in RF circuits to PCB prototyping.

Service

LPKF circuit board plotters ensure high quality work in labs and development departments around the world. With dedicated service and support professionals found in over 45 countries, finding reliable support for your ProtoMat is easy.

Technical Data: LPKF ProtoMat D104	
Laser class	1
Work area (X x Y x Z)	305 mm x 229 mm x 10 mm (12" x 9" x 0.4")
Resolution (X, Y, and Z)	3 µm (0.12 Mil)
Repeatability	1 µm (0.04 Mil)
Travel speed	100 mm (3.7")
Milling spindle	Max. 100 000 rpm, software controlled
Tool change	Automatic, 15 positions
Drilling speed	120 strokes/min
Diameter of focused laser beam	15 µm (0.6 Mil)
Laser structuring rate	2.8 mm/s on 18 µm Cu
Laser power (output)	100 mW
Laser wavelength	UV range
Software	LPKF CircuitPro (included)
Features	Vision system for optical fiducials/width monitoring, status light, vacuum table, pneumatic working depth limiter
System dimensions (W x H x D) incl. hood opening	660 mm x 700 mm x 870 mm (26" x 27.6" x 34.3")
Weight	< 100 kg (220.5 lbs)
Operating conditions	
Power supply (V, Hz, W)	85 V – 260 V AC, 50 – 60 Hz, 440 W
Ambient temperature	22 °C ± 2 °C (71.6 °F ± 4 °F)
Compressed air supply	6 bar / < 100 l/min (87 psi / < 3.5 cfm)
Hardware and software requirements	Windows XP, 32 bit or Windows 7, 32 / 64 bit, min. 2 GHz Single Core, 2 GB RAM, opt. 2.6 GHz Dual Core, 8 GB RAM, 2 x USB 2.0, screen resolution min. 1 024 x 768 pixels, opt. 1 680 x 1 050 pixels
Required accessories	Exhaust unit

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