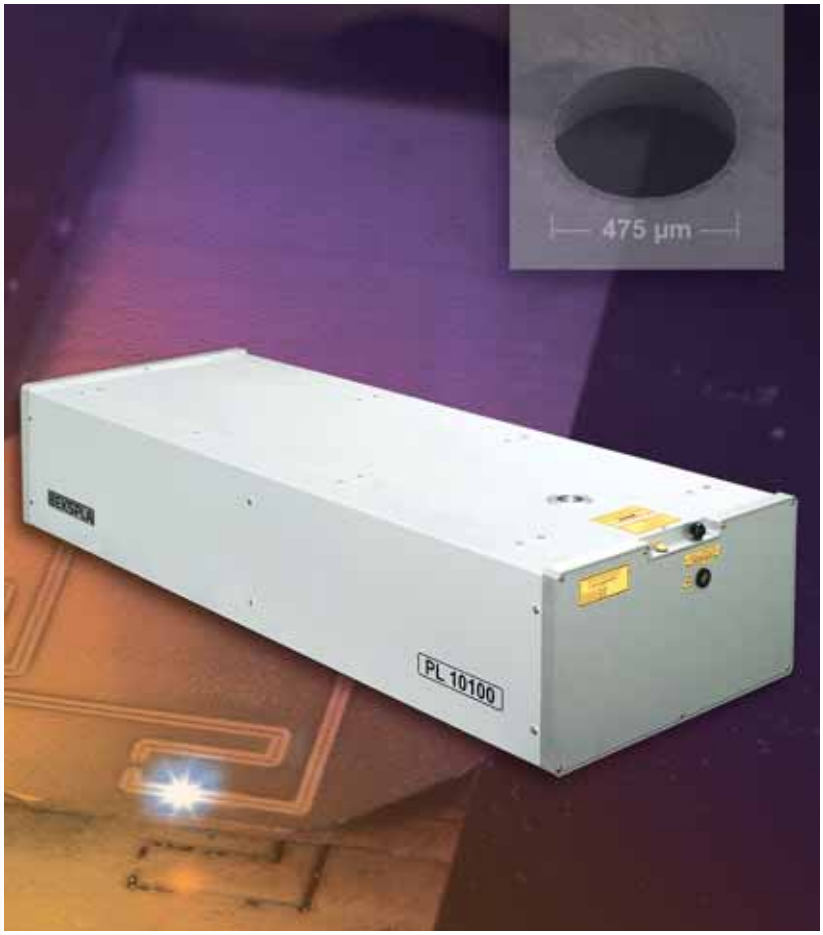
PL10100
SERIES

# Industrial Grade Picosecond Diode Pumped Laser




## FEATURES

- Up to **~ 200 µJ high** pulse energy
- Up to **100 kHz** repetition rate
- **Short** pulse duration **~10 ps**
- High stability and excellent beam quality **$M^2$<1.5**
- **10 W** output power at **1064 nm**
- **Reliable**, hands-free **operation**
- Compact, sealed and rugged design
- PC control and remote control keypad
- Low maintenance costs
- Single phase powering
- No external water cooling

## APPLICATIONS

- Drilling
- Cutting
- Paterning
- Structuring
- Ablation
- Micromachining
- Your applications are welcome...

Laser micromachining as the material processing technology on small and very small scale is finding numerous real world applications. Together with the newest technologies **diode-pumped solid-state** (DPSS) lasers are moving from research laboratories to production lines.

PL10100 – a **picosecond** high power and **high** pulse **energy laser** – from the very beginning is designed to be a versatile tool for variety of industrial material processing applications.

PL10100 is an **OEM rugged**, compact laser with **10 W** output power at **1064 nm**. It features high pulse energy (**up to 200 µJ),** high beam quality (**$M^2$ < 1.5**) and a very high repetition rate (**up to 100 kHz**) of typically **10 ps** pulses. Optional harmonics are available at **532 nm and 355 nm**.

PL10100 consists of a diode-pumped mode-locked **Nd:$YVO_4$** oscillator, a pulse picker and a diode-pumped regenerative amplifier. Optical components are placed in a robust, precisely machined monolithic aluminum block, which could be used as a separate module for customized solutions. The laser is sealed to provide stable operation in a long period. Designed for hands-free operation, the PL10100 offers a maximum of reliability due to optimized layout, PC-controlled operation, a built-in self-diagnostics and advanced status reporting. The superior beam quality allows easily focusing of the laser beam into the smallest spot size at various working distances and to reach laser fluences sufficient for processing of virtually any material.

PL10100 has been designed as a low-maintenance-costs solution. All replacements of consumables can be performed at user facilities by trained technicians.

EKSPLA
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# PL 10100 series

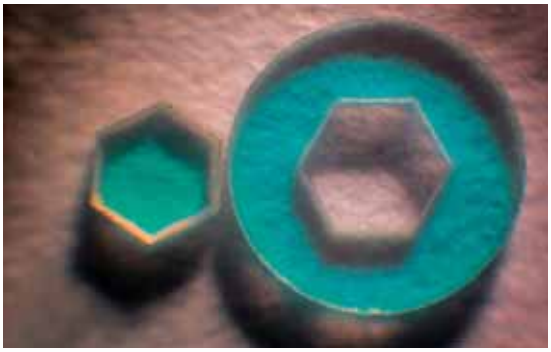
## ADVANTAGES OF PICOSECOND LASERS

New challenges in real-world applications of the laser micro-fabrication induce the picosecond lasers The pulse duration of the lasers is comparable to the time of electron-phonon relaxation and is short enough for "cold" ablation. Easy and effective conversion to UV radiation offers a cost effective source for micromachining. As well as shorter pulse duration results in lower ablation threshold what allows to use lower pulse energy and so less mechanical stress to sample is applied. As the same time picosecond lasers have a number of advantages of even shorter pulse femtosecond ones. Picosecond lasers are less complicated in their design as there is no need for pulse stretching and compressing for amplification what makes them more cost effective and more reliable at the same time pulse duration is short enough for most of processes.

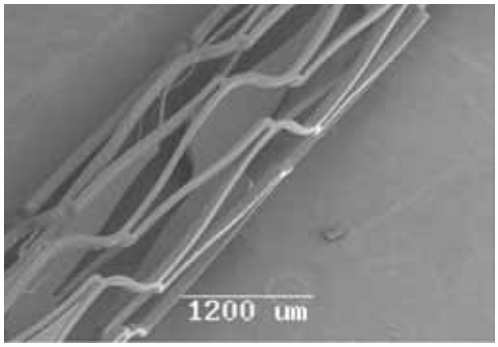
Picosecond laser micromachining workstation is capable of directly machining a wide range of micron scale features in almost all material, including:

- Metals
- Semiconductors
- Diamond
- Sapphire
- Ceramics
- Polymers
- Composites and resins
- Photoresists
- Thin films
- ITO films
- Glass

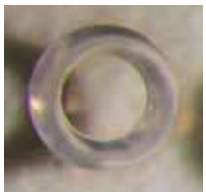
## MICROMACHINING SAMPLES



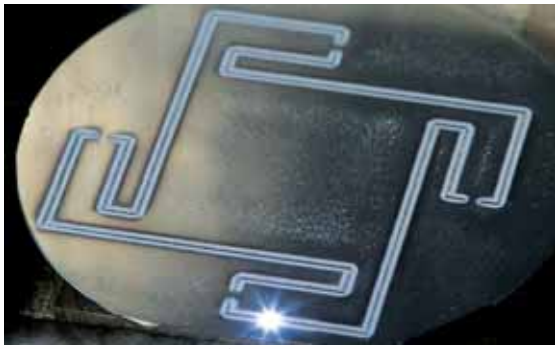
The round and hexagonal parts cut out from the LCD filter glass with thickness of 0.3 mm using the PL10100 laser radiation at 266 nm



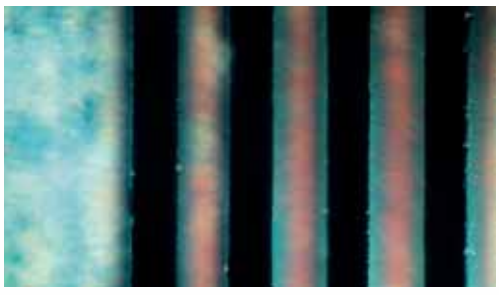

Stents cut from the Nitinol, Courtesy of CORTRONIK GmbH & Co. KG



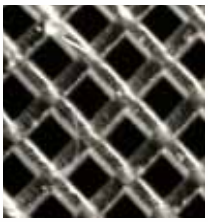
Glass structuring



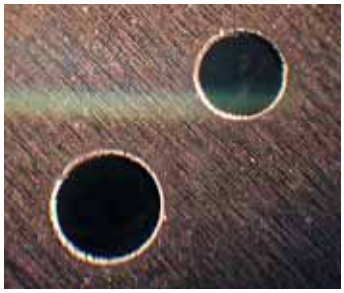
Silicon cutting



Slots cut in the Invar mask for OLED & LCD with the PL10100 laser: 266 nm, 100 kHz, 0.35 W; thickness 34 µm; cutting speed 5 mm/s

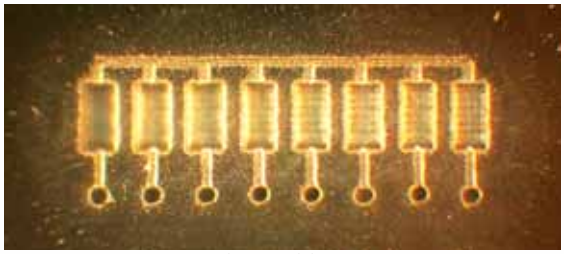


PMMA structuring



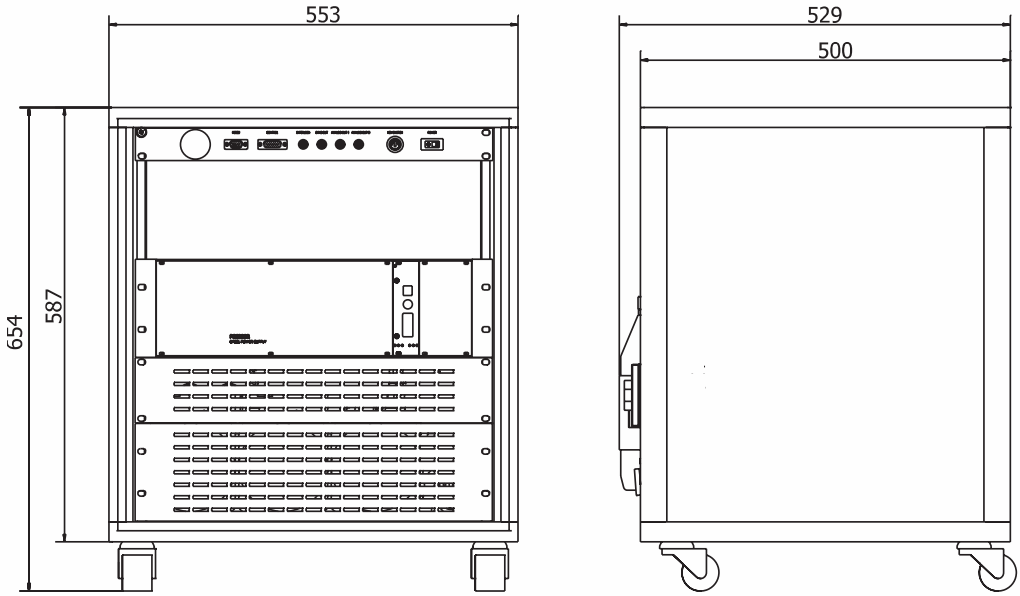
Holes cut by laser in tantalum (0.4 and 0.3 mm diameters)

Holes cut by laser in tungsten (0.5 and 0.3 mm diameters)

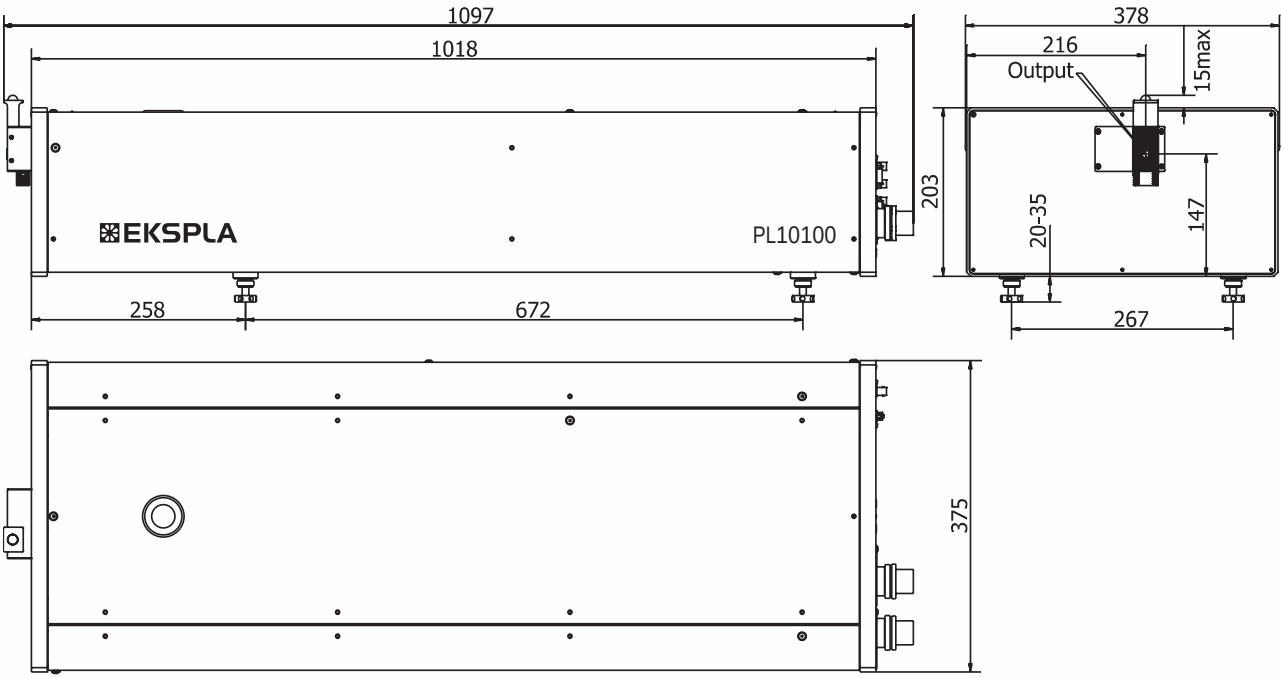


Polymer ablation

## LASER POWER SUPPLY OUTLINE DRAWING




## LASER HEAD OUTLINE DRAWING

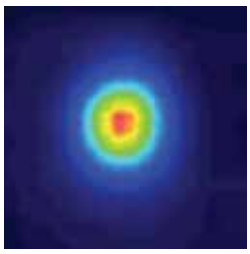


# PL 10100 series

## Specifications

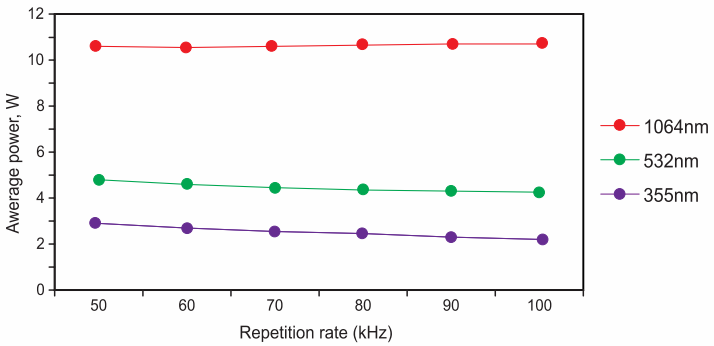
| Parameters | PL10100 | PL10100PC | PL10100SH | PL10100SH-PC | PL10100TH |
|---|---|---|---|---|---|
| Wavelength, nm | 1064 | | 532 | | 355 |
| Repetition rate range, kHz | 50-100 | 50-100 (*) | 50-100 | 50-100 (*) | 50-100 |
| Avarage output power at 100kHz , W | >10 | | >4 | | >2 |
| Pulse energy at 50kHz, µJ | >200 | | >80 | | >40 |
| Pulse energy contrast | >200:1 | | >1000:1 | | |
| Output shutter (Pockels cell) contrast | — | >300:1 | — | >200:1 | — |
| Pulse duration, ps | <10 | | | | |
| Polarisation | linear, vertical 100:1 | linear, horizontal 100:1 | | linear, vertical 100:1 | linear, horizontal 100:1 |
| $M^2$ | <1.5 | | | | |
| Spatial mode | $TEM_{00}$ | | | | |
| Beam divergence, mRad | <2.5 | | <2 | | <3 |
| Beam diameter, mm | ≈1 | | | | ≈1.8 |
| Timing jitter in respect to external triggering, ns | 12 | | | | |
| Pulse energy stability, % | <1 | | <2 | | |
| Average power long term drift, % | 2.5 | | | | 3 |
| Beam pointing stability, µRad | <100 | | | | |
| **Physical characteristics** | | | | | |
| Laser head size (WxLxH), mm | 375 x 1020 x 220 | | | | |
| Power supply unit(WxLxH), mm | 553 x 537 x 606 | | | | |
| Umbilical length, m | 2 | | | | |
| Beam height, mm | 170 | | | | |
| **Operating conditions** | | | | | |
| Operation ambient temperature, °C | 18-27 | | | | |
| Relative humidity (non condensing), % | 10-80 | | | | |
| Voltage | 100-240VAC, single phase, 47-63Hz | | | | |
| Power consumption, kW | <1.5 | | | | |

(*) Models with the pockels cell at the output beam. Burst and single pulse on demand.
Specifications are subject to change without notice.



Typical beam profile of
PL10100 series lasers. Far field

Typical output power for set of repetition rates

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