



Ophir measurement solutions & VCSELs

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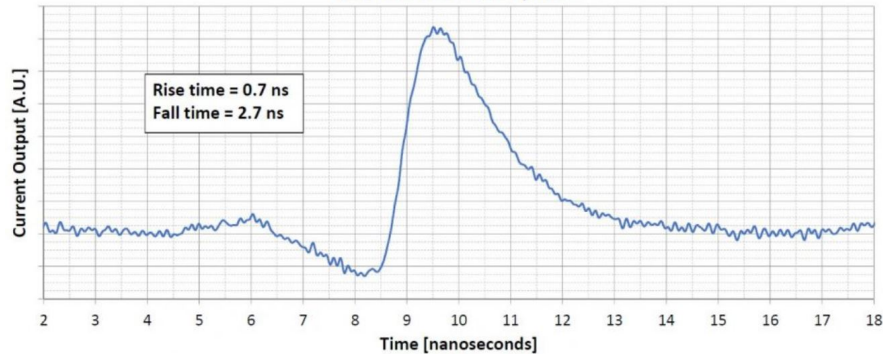
Who We are and What We do

- Ophir - MKS Instruments Light & Motion division
- Ophir product portfolio:
 - Laser and LED measurement products (sensors and imaging)
 - High-performance IR and visible optical elements
 - OEM and replacement high-quality optics for CO₂ and high-power fiber laser material processing applications
- Suitable measurement methods for Research and use of VCSELs required. Important points:
 - Optimal beam power and beam profile
 - Eye safety (average power & pulsed energy)
 - Energy efficiency

Measurement Solutions for VCSELs

- Power measurement
- Pulse energy measurement
- Pulse characterization

IS1.5-VIS-FPD-800 Temporal Response
to femtosecond laser pulse



Thermopile sensors & integrating spheres

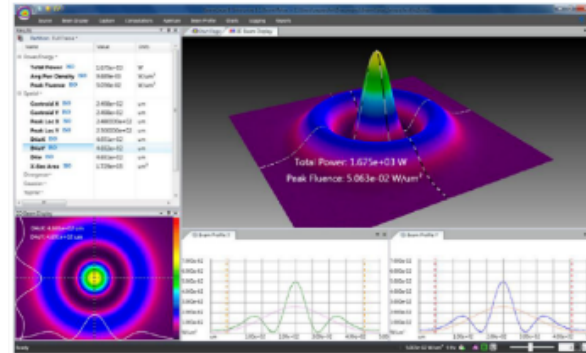
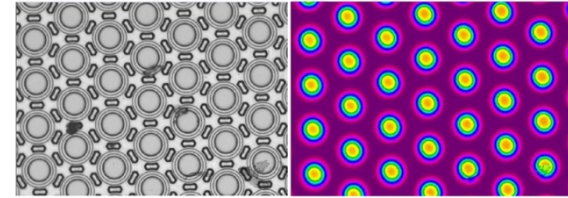
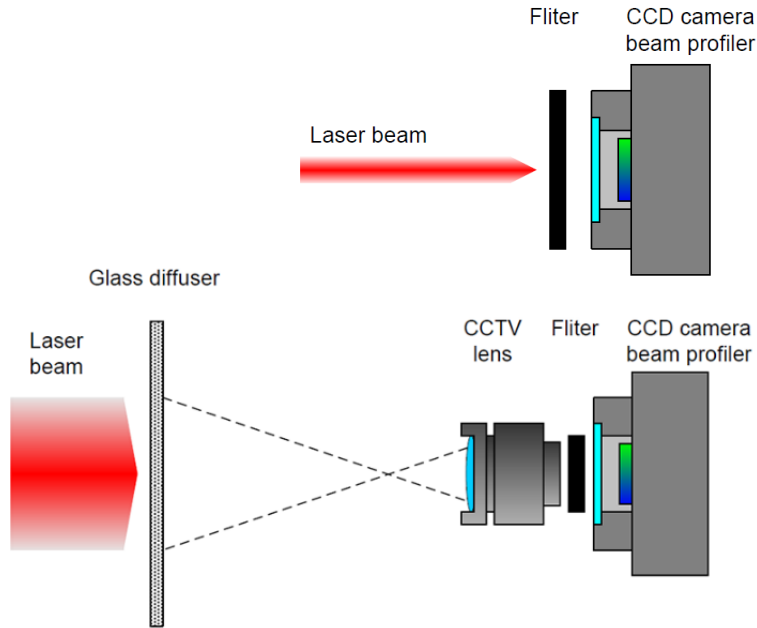


Gold plated 170° port adapter

Images: Ophir

Measurement Solutions for VCSELs

- Near field beam profiling
- Far field beam profiling



Images: Ophir

IS1.5-xx-FPD-xxx Sensors

- **Multi-functionality** - one device allows performing 3 different measurements simultaneously: power (peak power & pulse energy), temporal pulse shape detection, spectrometer connection via SMA fiber adapter
- **The combination** of the calibrated, slow PD with the FPD allows calibration of the FPD;
- **Testing of VCSELs** at the wafer level (no adequate heat outflow/operated at low duty cycles, i.e. short pulses)



IS1.5 design

- small sphere diameter and FPD provide fast rise and fall times
- 20 mm aperture allows for large working distance (1 cm or more)
- beams with divergence angles up to $\pm 60^\circ$

Images: Ophir

What We can do for You, what You can do for Us

Broad product offering

- Power measurements
- Fast pulse characterization
- Beam profiling

Cooperative efforts (further input)

- We are interested in strategic partnerships to develop the innovative solutions the partners need



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