

High performance 4W UVC LED module for water disinfection

As part of the activities in the field of water disinfection, *OSA Opto Light GmbH* had developed in close collaboration with *CIS Forschungsinstitut für Mikrosensorik GmbH*, *Fraunhofer Institut Optronik Systemtechnik und Bildauswertung*, and *Xylem Services GmbH*, a high performance UVC- LED radiation source, emitting 4 W optical power at an emission wavelength between 275 and 280 nm.



Figure 1 UVC LED module for water disinfection with a schematic illustration of the water reactor.

Several key features were successfully implemented to this LED module:

- A unique aluminum parabolic array of reflectors emitting the light at an angle of about 15°
- New anti-reflection coating on the front window with a transmission value of about 97% for a wavelength of 270-280 nm
- Reliable and efficient chip mounting process
- A new heat sink with a 40% lower thermal resistance compared to the old design, allowing low operation temperatures at power losses up to 400W
- Integrated electronic control unit with computer software that enable good monitoring of the operation state of the system, overheating protection, and a safety shutdown
- Computer-independent operation mode with the last saved settings

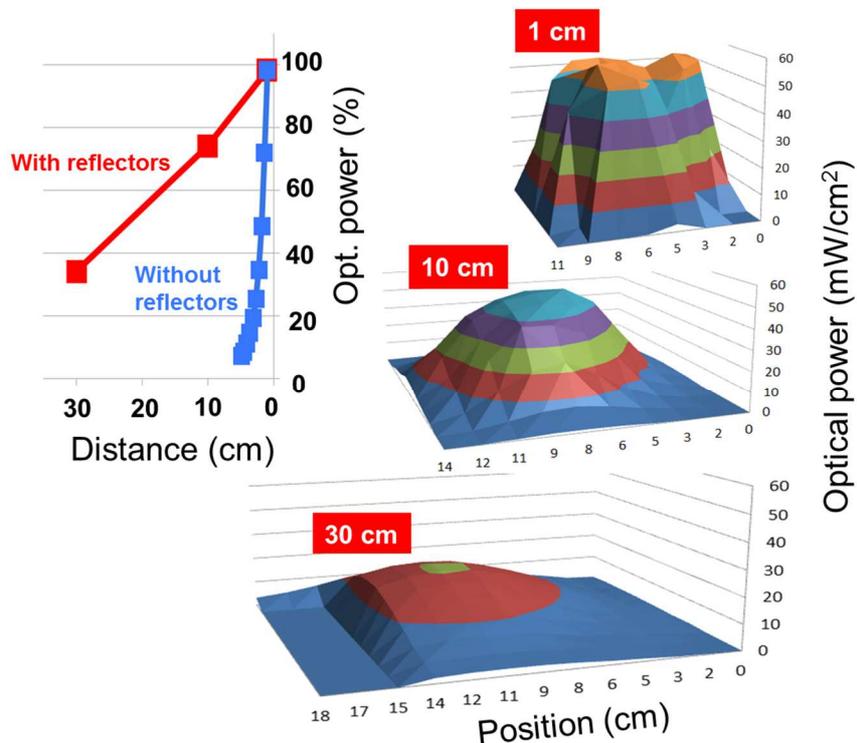


Figure 2 Irradiance distribution of the 4W LED module at three distances: 1, 10, 30 cm

The distribution of the irradiance at a distance of 1, 10, and 30 cm from the front window can be seen at figure 2. The usage of our parabolic reflector arrays enables to achieve at a distance of 25 cm a maximum optical power density of about 30 mW/cm², which is 50% from the initial maximum optical power density. For comparison one can see according to the blue curve in the figure the Lambertian radiation of an LED module without lens or parabolic reflectors.

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