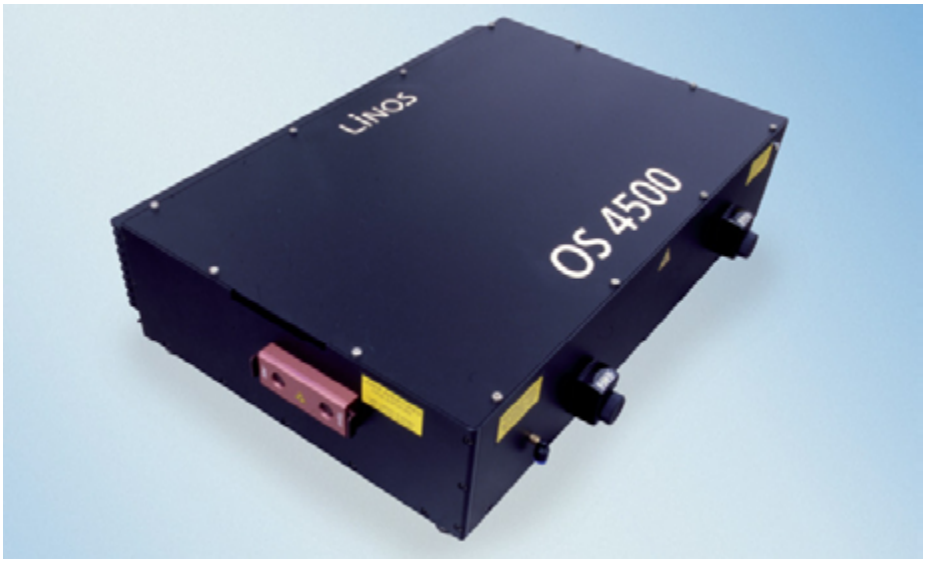
OS 4500 / OS 4500-DC

Continuous-Wave Singly-Resonant OPO with Pump-Enhancement
All Solid State Infrared Laser Source(1.38 – 2.00 µm and 2.28 – 4.67 µm)



System Description

The OS 4500 is a compact, all-in-one continuous-wave laser source combining excellent spectral properties with an extremely large tuning range. Features like:

- Single Frequency Operation
- Narrow Linewidth
- Low Noise
- Outstanding Beam Quality

Which make it the ideal tool for high-resolution spectroscopy and many other applications requiring precision metrology in the infrared spectral region.

The OS 4500 system is an optical parametric oscillator (OPO) completely equipped with control and stabilization electronics as well as an integrated pump laser. Its output is converted into signal and idler radiation in a nonlinear crystal (periodically poled, MgO doped lithium niobate). The crystal is placed inside an optical resonator which forms the actual OPO at the heart of the system. An intra-cavity etalon (ICE) ensures stable single-frequency operation.

The large emission range for signal (1.38 – 2.00 µm) and idler (2.28 – 4.67 µm) radiation is achieved by integrating several poling periods on a single crystal. No change of optical components is required to tune the system to any desired emission frequency. Tuning can be performed on several levels:

- Coarse tuning is done by manually changing the lateral position of the nonlinear crystal to select a suitable grating.
- Temperature tuning is then used to find the desired wavelength within one grating.
- Etalon tuning selects the desired cavity mode of the resonated radiation within the gain bandwidth of the OPO.
- Continuous tuning without mode-hops is performed by changing the frequency of the pump laser.

OS 4500 - Standard Specifications

Pump wavelength	1064 nm
Signal emission range	1380 – 2000 nm
Idler emission range	2280 – 4670 nm
Typ. continuous tuning range	~ 2 GHz Signal, ~ 1 GHz Idler
Short-term linewidth	< 50 kHz (1ms) < 10 kHz (20 µs)
Frequency drift	< 50 MHz/h
Maximum output power of idler radiation	2 x 50 mW (HP: 2 x 80 mW)
Maximum output power of signal radiation	2 x 20 mW (HP: 2 x 30 mW)
Power drift	< 5 %/h
Spatial mode	TEM_{00}
Power requirements	115/230 V, max. 150 W
Ambient temperature	15 – 30 ° C
Dimensions (knobs, connectors,.etc. not included)	364 mm x 587 mm x 125 mm (14.33” x 23.11” x 4.92”)

Options

High Pump Power Option (HP)

In its standard configuration, the OS 4500 is equipped with a 1.2 W pump laser. The OS 4500 can also be shipped with a 2 W pump laser, for which the output power is increased by approx. 50 %.

Galvo Option

The etalon tilt, which selects the frequency of the resonated signal wave, is usually adjusted manually via a corresponding precision screw. Alternatively, the OPO can be equipped with a galvo scanner to adjust the tilt electronically. The electronics then provides an analog input for the etalon tilt. To optimize the continuous tuning performance of the OPO, this input can use the scan signal from the pump laser to adjust the etalon tilt in a feed-forward manner.

Special Model: OS 4500-DC

The OS 4500-DC is designed for applications with a need for wider continuous tuning. This is accomplished by a new resonator design, which enables to fully transfer the pump laser frequency detuning to the idler wave. The pump laser frequency is continuously tunable over mode-hop-free sections of 6-9 GHz, 30 GHz in total. The continuous signal frequency detuning is done by changing the signal resonator length via a piezo-element. The wavelength range is slightly smaller than for the OS 4500 standard design. Also the long-term frequency drift is increased. The OS 4500-DC can be converted into the standard design (see “OS 4500 - Standard Specifications”) by its user with only minor effort. The OS 4500-DC is equipped with a 2 W pump-laser and a galvo scanner to adjust the etalon tilt. On request, the OS 4500-DC can also be shipped with a 2.5 W pump laser. The typical specifications of the OS 4500-DC are given in the following table.

OS 4500-DC Specifications

Pump wavelength	1064 nm
Signal emission range	1440 – 2000 nm
Idler emission range	2280 – 4100 nm
Typ. continuous tuning range	~ 2-6 GHz Signal, ~ 6-9 GHz Idler
Short-term linewidth	< 10 kHz (20 µs)
Frequency drift	< 500 MHz/h
Maximum output power of idler radiation	80 mW / 60 mW (front/rear aperture)
Maximum output power of signal radiation	30 mW / 8 mW (front/rear aperture)
Power drift	< 5 %/h
Spatial mode	TEM_{00}
Power requirements	115/230 V, max. 150 W
Ambient temperature	15 – 30 ° C
Dimensions (knobs, connectors,.etc. not included)	364 mm x 587 mm x 125 mm (14.33” x 23.11” x 4.92”)

Other specifications on request.

For technical information contact:saleschina@rayscience.com.