

# Koheras MIKRO

Compact low-noise 1.5  $\mu\text{m}$  OEM fiber laser



## THE SMALLEST INDUSTRIAL SINGLE-FREQUENCY FIBER LASER

**Ideal for OEM integration in sensor applications**

The Koheras MIKRO is the smallest industrial single-frequency fiber laser on the market. It is designed for OEM integration in industrial sensing systems.

The module includes fully integrated laser control electronics as well as continuous monitoring of the laser performance.

### Applications

- Distributed optical sensing
- Pipeline integrity monitoring
- Perimeter security and surveillance
- Laser vibrometry

# KOHERAS MIKRO

## The smallest foot-print available

The Koheras MIKRO is the smallest industrial single-frequency fiber laser on the market. The module includes fully integrated laser control electronics as well as continuous monitoring of the laser performance.

## Tunable output power and center wavelength

The output power is 40 mW for the E15. The center wavelength can be chosen freely in the 1535-1580 nm range.

## Ideal for OEM integration in sensor applications

The MIKRO laser is ideal for sensor applications such as distributed optical sensing and laser vibrometry that require low noise, high wavelength stability and ultra-stable single-frequency operation, free of mode hops.

## Easy to control via a graphical user interface

For easy control, the MIKRO is available with an optional USB interface kit and can be controlled via the NKTP CONTROL graphical user interface.

Model	E15
Standard wavelengths	1550.12 nm
Other wavelengths	1535-1580 nm
Output power	40 mW <sup>†</sup>
PM fiber delivery	Optional
Fast modulation	Optional

<sup>†</sup> Adjustable output power

# FEATURES

## Fast wavelength modulation and thermal tuning

A key advantage of our distributed feedback fiber laser technology is the freedom to choose the operating wavelength.

Standard systems are available at 1550.12 nm and we offer special systems anywhere in the 1535 – 1580 nm range.

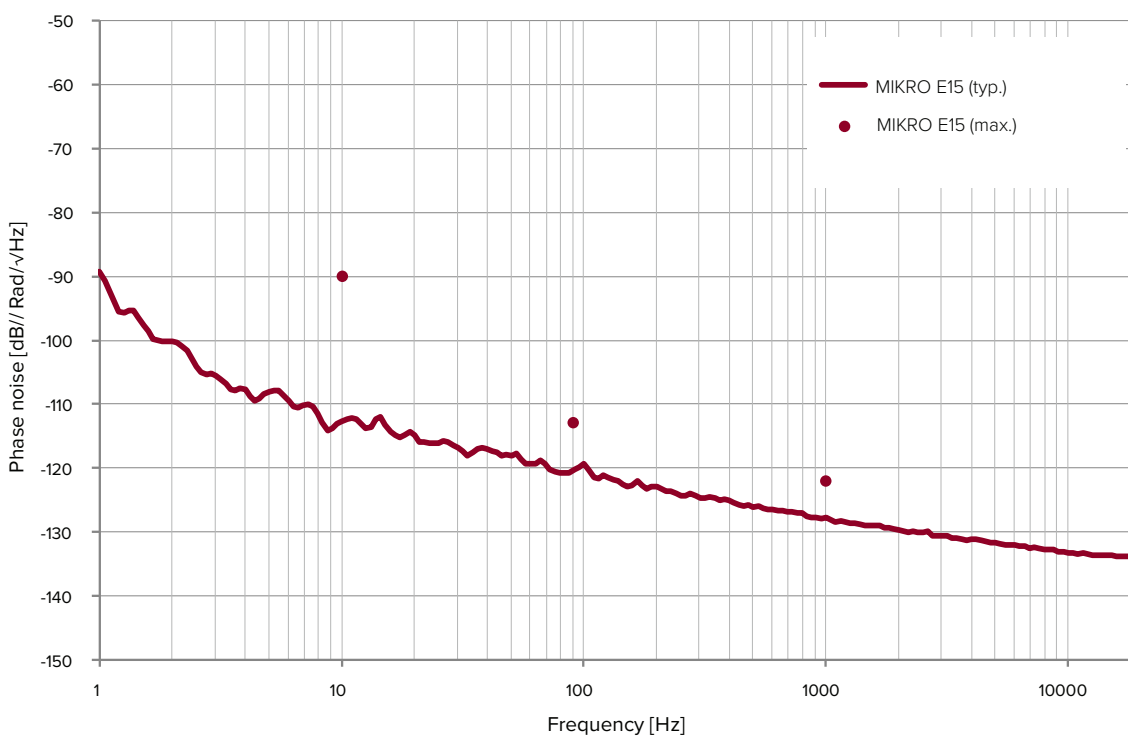
The laser offers a wide thermal tuning range, optionally combined with fast wavelength modulation e.g. for external stabilization.

## Ultra-low frequency noise

The MIKRO laser features a very low frequency noise, unparalleled in industrial OEM laser modules.

The robust, single-frequency operation and low noise make the MIKRO lasers a strong choice for coherent sensing applications where ultra-low frequency noise is a key laser parameter for the sensitivity and accuracy of a sensing system.

The plot below compares frequency and phase noise of the E15. The graphs represent typical measurements while the dots indicate the guaranteed maximum values.



## Features

- Narrow linewidth
- Ultra-low phase noise
- Stable single-frequency operation
- High wavelength stability
- Plug and Play
- Industrial OEM packaging
- Robust and maintenance-free
- Multi-channel system or stand-alone

# OPTIONS

## Fast wavelength modulation

The MIKRO module can be supplied with easy and user-friendly fast wavelength modulation in order to lock the laser to an external stable reference and get an even higher wavelength stability than provided by the free-running laser.

## Polarization-maintaining fiber output

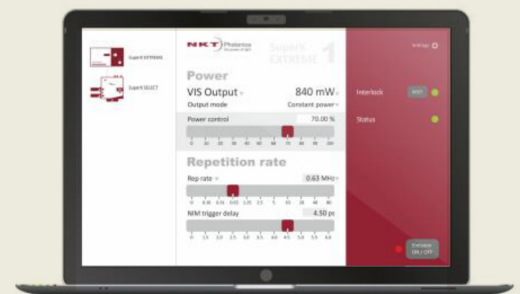
The standard output is single mode fiber. However, we always offer a polarization maintaining option to ensure a fixed orientation of the polarization. This may be required in case the laser output needs to be externally modulated or frequency converted.

## Easy to control via a graphical user interface

For easy control, the MIKRO is available with an optional USB interface kit and can be controlled via our NKTP CONTROL graphical user interface.

## Options

- Center wavelengths in the 1535–1580 nm range
- Fast wavelength modulation
- Multi-channel integration
- Polarization-maintaining fiber output
- Graphical user interface
- Optical monitor output



## Software

### — NKT Photonics CONTROL

Like other NKT Photonics lasers, the Koheras MIKRO can be controlled by our intuitive CONTROL software that gives easy access to all the functions in the laser.

The software automatically detects all units attached to the computer. You can control several lasers simultaneously. It is easy to use and supports touch input as well as traditional mouse+keybord control.

# SPECIFICATIONS

## Optical

<b>Model</b>	<b>E15</b>
Laser emission	CW - inherently single frequency
Beam quality	$M^2 < 1.05$
Linewidth [kHz] <sup>1)</sup>	< 0.1
Max. phase noise [dB((rad/√Hz)/m)]	-90 @ 10 Hz -110 @ 100 Hz -130 @ 20 kHz
Max. phase noise [(μrad/√Hz)/m]	32 @ 10 Hz 3.2 @ 100 Hz 0.3 @ 20 kHz
RIN peak [MHz]	Approximately 0.7
RIN level [dBc/Hz]	< -100 @ peak < -135 @ 10 MHz
Optical S/N (50 pm res.) [dB]	> 50 (typ. 55) <sup>2)</sup>
Min. thermal wavelength tuning range [pm] <sup>3)</sup>	± 150
Total thermal wavelength tuning range [pm]	450
<b>Options</b>	
Fast wavelength modulation range [GHz]	> 8
Fast wavelength modulation [kHz]	Up to 20
PM output - PER [dB]	> 23

1) 120 μs integration time

2) >47 dB (typ. > 52 dB) for non-PM version.

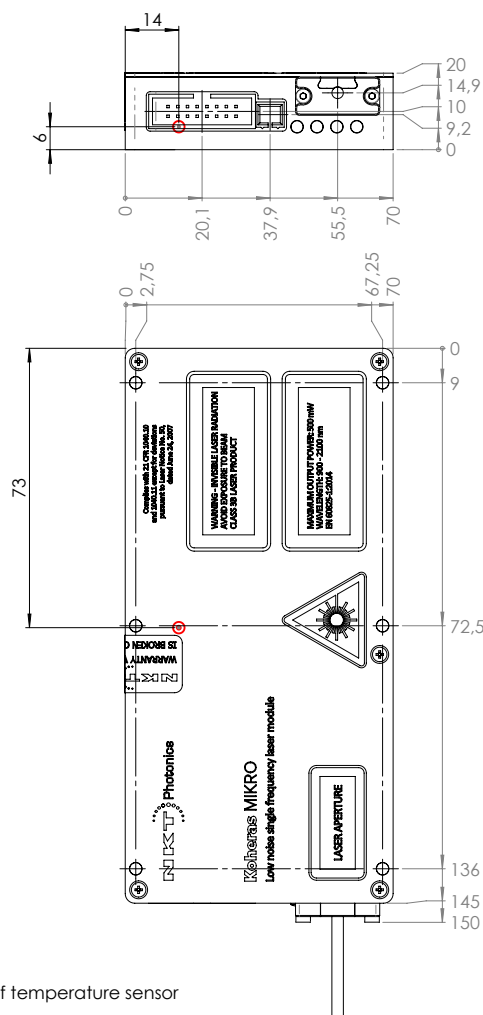
3) Relative to center wavelength at room temperature. If the laser case temperature is outside the interval of approximately 10-50 °C, the range of detuning from the center wavelength may be reduced.

# SPECIFICATIONS

## Mechanical/Electrical/Environmental

Power supply requirements [VDC]	12
Power consumption [W]	Typical 4, max. 10
Communication interface	RS-485
Optical output	Standard: FC/APC pigtail, 0.5 m Optional: Bulkhead/pigtail FC/APC, SC/APC
Operation temperature [°C] <sup>1)</sup>	15 – 60
Dimensions (WxHxL) [mm <sup>3</sup> ]	70 x 20 x 150
Weight [kg]	0.35
Humidity non-condensing [% RH]	0 – 70

1) Module temperature. For other temperature options, please contact us.



Location of temperature sensor

All Koheras products are produced under our quality management system certified in accordance with the ISO 9001:2015 standard.



## Reliability

The Koheras range of single frequency fiber lasers is based on telecom-grade fiber components and built to last thousands of hours with no service or maintenance.

With several thousand lasers installed in environments varying from fully climate controlled national standards laboratories to the demanding environment on oil rigs and submarines, the Koheras line is the most robust single-frequency laser range on the market with an unmatched reliability track record.

## Service and warranty extensions

The Koheras warranty and service package ensures trouble free operation of your Koheras laser.

The Standard Package gives you a two year warranty extension plus remote diagnostics of key laser parameters through a remote connection to the system.

Our Premium Package adds a guarantee that we always stock a laser with your specifications - ready to ship - should you need it.

### Standard package

- Extension of warranty period to 2 years
- Remote diagnostics
- Preventive laser health checks

### Premium package

- All the benefits of the standard package
- Pre-produced custom-specific laser in stock