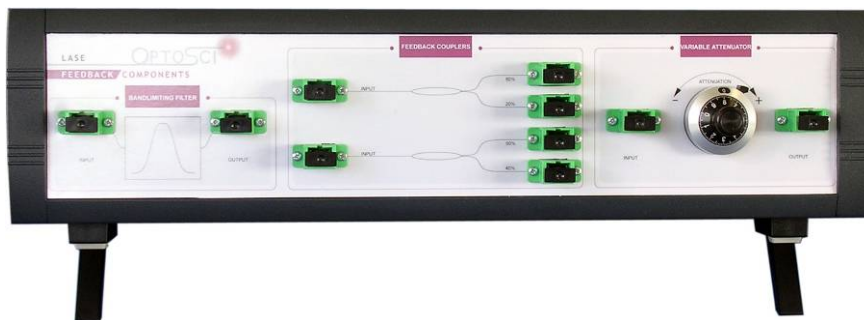


Educator Kit

LASE

EXTENSION TO THE ED-AMP EDUCATOR KIT TO ALLOW THE USER TO PERFORM ADDITIONAL EXPERIMENTS ON FIBRE LASERS



MAIN FEATURES AND BENEFITS:

- When used as an extension to the ED-AMP kit, provides all fibre optic hardware required to perform the fibre lasers experimental investigation
- Extensive literature support including: student and instructor's manuals with exercises, solutions & sample results
- Detailed lecture notes, tutorial examples and solutions to assist with the development of courses
- Saves significant course, literature and hardware development effort

THE EXPERIMENTAL INVESTIGATION* ADDRESSES:

- Full gain characteristics of the Erbium doped fibre (EDF) gain medium
- Construction of a fibre ring laser
- Measurement of lasing threshold
- Measurement of slope efficiency
- Effect of intra-cavity loss on the slope efficiency and threshold
- Influence of output coupling ratio on slope efficiency and threshold
- Laser dynamics: relaxation oscillations, excitation lifetime, laser onset time

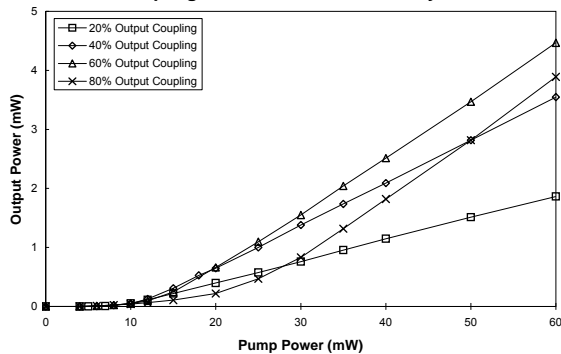
* Full details of the experiments and equipment specifications are provided overleaf

Laboratory Exercises

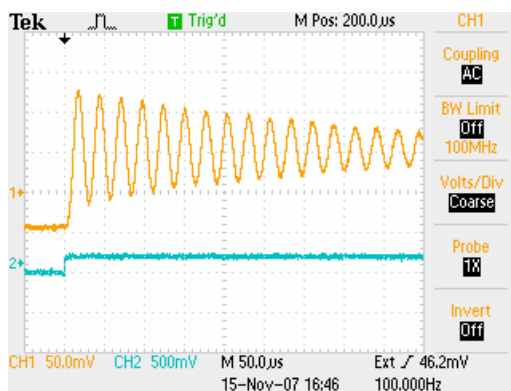
The LASE add-on module to ED-AMP allows students to construct an erbium doped fibre ring laser and conduct a detailed investigation into its performance, output characteristics and dynamic response. When used with the ED-AMP kit the following experiments can be performed:

- Measurement of output power and gain of the EDF amplifier over a large range of input signal levels for several fixed pump levels. This enables investigation of small signal gain, large signal gain and gain saturation (See ED-AMP data sheet for full details of the optical amplifier investigation).
- Construction and operation of an EDF ring laser

Laser output characteristics for 4 values of output coupling ratio and 13dB intra-cavity loss



- Measurement of laser output power and gain as a function of pump power for various levels of intra-cavity loss.
- Measurement of laser output power and gain as a function of pump power for various values of the output coupling ratio.
- Investigation of slope efficiency and threshold as a function of intra-cavity loss.
- Examination of slope efficiency and threshold as a function of output coupling ratio.



- Measurement of relaxation oscillations and laser onset time delay as a function of different pump powers, levels of intra cavity loss and output coupling ratios.
- Investigation of the square of the relaxation oscillation frequency versus pump power in order to derive the excitation lifetime.

Product Description

The OPTOSCI LASE module is an extension of OPTOSCI's ED-AMP educator kit. It uses the erbium doped fibre amplifier and interrogation unit employed in ED-AMP (see ED-AMP data sheet for full details) with the addition of the following equipment:

- A set feedback couplers (20%, 40%, 60% and 80%) to alter the output coupling ratio (i.e. mirror reflectivities).
- An in-line external variable attenuator (0 to 30dB) to simulate intracavity loss.
- A bandpass filter ($\lambda_c \approx 1550\text{nm}$) to stabilise the laser operating wavelength and to suppress ASE power.
- All of the necessary fibre cable patchcords and adaptors to enable connection between the various units of the system.

In addition, a comprehensive literature package accompanies each kit:

- Student laboratory manual, describing the background theory and experimental procedure, with associated exercises to encourage the student to discuss the implications of their results.
- Instructor's manual dealing with all aspects of using the equipment and providing sample results for the experiments and exercises.
- Extensive lecture notes on laser oscillator characteristics, fibre ring lasers and their applications.
- A comprehensive set of tutorial examples and their solutions.

Additional required equipment:-

- OPTOSCI ED-AMP educator kit.
- Signal/Function generator: 0-5V square wave output of 10Hz & 100Hz, DC offset capability.
- 2-channel laboratory oscilloscope, $\geq 20\text{MHz}$ b/w

Accessories

- Laser safety spectacles with OD3+ at 1550nm are available directly from OPTOSCI.

Full ED-LASE Educator Kit

- A fully independent ED-LASE Principles of Lasers educator kit is also available (see ED-LASE datasheet for full details)

Ordering Information

LASE	Lasers Module
SPECS	Laser Safety Specs OD3+ 1550nm
ED-AMP	Erbium Doped Fibre Amplifiers

Since OPTOSCI are committed to continuously improving the design and performance characteristics of our products, these specifications are subject to change without notice.

Date: March 2018