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IPC Irwin Semiconductor Laser 630nm

Part Number IPC-2588-L

User Instructions



INTRODUCTION.

The IPC Irwin Semiconductor Laser 630nm emits an intense red laser beam (Class II safety) and is ideal for the demonstration of the behaviour of light in a visually effective way, reinforcing the practical work carried out by pupils using white light. It is an essential tool to develop the basic understanding of the passage of light through different media, slits etc. The laser has been designed to be modulated either internally or externally, this allows speed-of-light experiments to be easily performed, as well as demonstrating light through light guides and optical fibres. The growth of laser communication systems and research into the use of lasers in computers of the future make this an essential piece of equipment to bring up-to-date relevance into teaching.

DESCRIPTION.

The laser output produced from this unit is a monochromatic red beam with a wavelength of 630nm and a maximum optical power of 0.9mW (Class II operation), the laser beam itself has a typical beam divergence of 1 milliradian. In addition, the laser is fitted with an adjustable optical lens therefore allowing the beam to be accurately focused. The laser output can be modulated at 1MHz with 0.1us pulses using the unit's internal frequency generator, alternatively the laser can be modulated using an external digital or analogue waveform, therefore allowing a wide range of modulation options.

The laser is powered by either an internal 9VDC battery (not supplied with the unit) or via an external DC Power Supply capable for supplying a voltage between 8 to 12VDC and a current of 60mA.

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As a safety precaution a key switch is used to turn the laser output on & off (two keys are supplied with the unit), as an extra safety a dust cap is also supplied and fitted to the laser focusing lens, this should only be removed when operating the unit. The laser unit itself is housed in a robust black anodised aluminium case with a detailed safety and operating label affixed to the top.

SAFETY.

When using the laser, safety precautions should be rigidly observed, the laser beam should not be viewed by looking directly into the beam or a regularly reflected beam. Attention is drawn to the BSI Standards Publication: Safety of Laser Products (BS EN 60825-1:2014) on the classification and requirements lasers. The lens safety dust cap should always be replaced then the laser is not in use.

INSTRUCTIONS.

When operating the Semiconductor Laser 630nm the following modes of operation can be used:-

Continuous Mode: (please read before moving onto the alternative modes).

Remove the safety dust cap from the focusing lens and switch on the laser with the key switch. The beam can be collimated or focused by loosening the nylon screw on the lens housing and moving the lens tube in or out, finger tighten the nylon screw to lock the lens tube in place. In this mode the laser produces a continuous optical intensity, ie. no modulation.

External Modulation Mode:

The optical intensity of the laser beam can be modulated by connecting an external digital or analogue signal/waveform via a suitable lead to the 3.5mm jack socket marked 'EXT' (shown on the top label). The modulated laser beam can be monitored using a suitable photodiode or by using the IPC Irwin Modulated Laser Receiver (IPC-2125-L).

Internal Modulation Mode:

To operate the Laser unit's internal frequency generator simply connect a 3.5mm jack plug to the socket marked 'INT' (shown on the top label). The will automatically modulate the laser beam at a frequency of approximately 1MHz with 0.1us pulses, the modulation pulses can be monitored via a lead fitted to the 3.5mm jack plug and connected to an oscilloscope. This mode may be used to measure the 'speed-of-light' as follows:-

1. Electrically monitor the pulses from the 'INT' the 3.5mm jack socket on channel 1 of an oscilloscope set to 2V/div (ac coupled) at 0.1us/div.
2. Optically monitor the modulated laser beam using a suitable photodiode or by using a Modulated Laser Receiver, such as the IPC Irwin receiver type: IPC-2125-L. Connect the optical receiver output to channel 2 of the oscilloscope and note the position of the pulse.

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3. Finally place a mirror 10 metres or more away and reflect the modulated laser beam off the mirror back to the receiver, use a lens to focus the beam onto the detector window, note the position of the pulse on the oscilloscope. The difference in position of the pulse noted in section No2 and this reflected pulse gives the time taken for the laser beam to travel the distance to the mirror and back, if the distance is known then the 'speed-of-light' can be calculated.

Further Experiments:

A document containing descriptions of a number of standard experiments and investigations which can be performed using this Semiconductor Laser 630nm has been compiled by IPC Irwin. To access this document please visit the IPC website www.ipcel.co.uk and open the Experiments link at the top of the page, alternatively you can contact IPC Irwin directly to obtain a copy.

Battery Fitting:

To fit the PP3 9V battery simply unclip and slide open the battery holder compartment found on the underside of the unit, then fit the battery into this (noting the correct polarity), finally slide and clip the holder compartment back in place. Note: we recommend that the battery is removed if the laser unit is to be stored for a long period of time.

Contents:

1 x Semiconductor Laser 630nm, 1 x Safety/Dust Cap & 2 x Keys (placed in battery compartment).

Accessories:

The following accessories are available to use with the Semiconductor Laser 630nm:-

Modulated Laser Receiver (IPC-2125-L), Stand & Rod (IPC-2397-L), Laser PSU Lead (IPC-2610-L), Laser Power Supply & Lead (IPC-2620-L), Spare Round Key (IPC-2492-L) and Spare Flat Key (IPC-2491-L).

SPECIFICATIONS.

External Electrical Supply	= 8 to 12VDC via DC Power Input Socket (centre pin is neg.).
Internal Electrical Supply	= 9V Battery (type: PP3).
Laser Output Wavelength	= 630nm Typ. (625nm min. – 635nm max.).
Laser Output Power	= 0.9mW (0.95mW Maximum).
Laser Beam Divergence	= 1 milliradian approx.
Internal Modulation Freq.	= 1MHz, 0.1us Pulses.
Dimensions	= 65 x 65 x 160mm (overall).
Mass	= 0.35kg (not including battery).

Please Note: This Equipment is for Education, Training, or research Purposes Only.

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