Construct, Conduct & Comprehend Physics Experiments

LEOI-57 Apparatus for Properties Measurement of Semiconductor Laser

- Rich experimental contents
- Convenient in operation
- Stable & reliable experimental performance
- Complete system

Semiconductor lasers, using semiconductor materials as working substances, are similar to gas and solid lasers that in principle have the basic structure composed of working substance, resonant cavity and excitation energy source. The main working substances of semiconductor lasers include GaAs, MoSb, ZnS, CdS and so on. The cleavage planes of a semiconductor crystal are generally used as mirrors to form a resonant cavity. Commonly used excitation energy sources include electrical injection, light stimulation, high-energy electron beam excitation and collision ionization excitation. To generate laser emission, the Gain Condition and Threshold Condition must be met. The output wavelength range of semiconductor lasers is relatively wide, generally from 0.3 microns to 30 microns. Owing to these excellent characteristics of small size, high efficiency, long life and high-speed modulation ability, semiconductor lasers have an extremely wide range of uses.

LEOI-57 apparatus for measuring characteristics of semiconductor laser consists of a suitcase (including temperature control device, display of angle sensor, laser power meter, laser power supply, voltage meter, etc.), semiconductor laser device (including heating device, cooling fan, and angle sensing device, etc.), slide rail, polarizer and analyzer, optical power detector, and so on. It is designed to measure the electrical and optical characteristics of a small-power semiconductor lasers (optical power less than 2 mW). The apparatus has features of rich experimental contents, convenient in operation, stable and reliable experimental performance.

Using this apparatus, students can conduct the following experiments on a semiconductor laser:
1. Measure the far-field distribution of the beam and calculate its vertical and horizontal divergent angles.
2. Measure the voltage-current characteristics.
3. Measure the relationship between output optical power and current, and acquire its threshold current.
4. Measure the relationship between the output of optical power and current at different temperatures, and analyze its temperature characteristics.
5. Measure the polarization characteristics of the output light beam and calculate its polarization ratio.
6. Optional experiment: verify Marius' law.

Specification

Item	Specifications
Semiconductor Laser	Output Power< 2 mW
	Center Wavelength: 650 nm
Power Supply of Semiconductor Laser	0 ~ 4 VDC (continuously adjustable), resolution 0.01 V
Photo Detector	Silicon detector, aperture of light entrance 2 mm
Angle Sensor	Measurement range 0 - 180°, resolution 0.1°
Polarizer	Aperture 20 mm, rotation angle 0 - 360°, resolution 1°
Light Screen	Size 150 mm × 100 mm
Voltmeter	Measurement range 0 - 20.00 V, resolution 0.01 V
Laser Power Meter	2 μW ~ 2 mW, 4 scales
Temperature Controller	Control range: from room temperature to 80 °C, resolution 0.1 °C

Parts

Description	Qty
Main suitcase	1
Laser support and angle sensing device	1 set
Semiconductor laser	1
Slide rail	1
Slide	3
Polarizer	2
White screen	1
Support of white screen	1
Photo detector	1
3-core cable	3
5-core cable	1
Red connection wire (2 short, 1 long)	3
Black connection wire (medium size)	1
Black connection wire (large size, 1 short, 1 long)	2
Power cord	1
Instruction manual	1

Lambda Scientific Systems, Inc.
16300 SW 137th Ave, Unit 132
Miami, FL 33177, USA
Phone: 305.252.3838 Fax: 305.517.3739
E-mail: sales@lambdasys.com
Web: www.lambdasys.com

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