
**Optics and photonics — Lasers and
laser-related equipment — Test
methods for the spectral
characteristics of lasers**

*Optique et photonique — Lasers et équipement associé aux lasers —
Méthodes d'essai des caractéristiques spectrales des lasers*



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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

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Introduction

The spectral characteristics of a laser, such as its peak wavelength or spectral linewidth, are important for potential applications. Examples are the specific application requirements of interferometry and lithography. This International Standard gives definitions of key parameters describing the spectral characteristics of a laser, and provides guidance on performing measurements to determine these parameters for common laser types.

The acceptable level of uncertainty in the measurement of wavelength will vary according to the intended application. Therefore, equipment selection and measurement and evaluation procedures are outlined for three accuracy classes. To standardize reporting of spectral characteristics measurement results, a report example is also included.

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Optics and photonics — Lasers and laser-related equipment — Test methods for the spectral characteristics of lasers

1 Scope

This International Standard specifies methods by which the spectral characteristics such as wavelength, bandwidth, spectral distribution and wavelength stability of a laser beam can be measured. This International Standard is applicable to both continuous wave (cw) and pulsed laser beams. The dependence of the spectral characteristics of a laser on its operating conditions may also be important.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 11145, *Optics and optical instruments — Lasers and laser-related equipment — Vocabulary and symbols*

ISO 12005, *Lasers and laser-related equipment — Test methods for laser beam parameters — Polarization*

IEC 60747-5-1, *Discrete semiconductor devices and integrated circuits — Part 5-1: Optoelectronic devices — General*

Guide to the expression of uncertainty in measurement (GUM), BIPM ¹⁾, IEC, IFCC ²⁾, ISO, IUPAC ³⁾, IUPAP ⁴⁾, OIML ⁵⁾, 1993, corrected and reprinted in 1995

International vocabulary of basic and general terms in metrology (VIM), BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML, Geneva, ISO

3 Terms and definitions

For the purposes of this document, the terms and definitions given in the VIM, ISO 11145 and IEC 60747-5-1, and the following apply.

3.1

wavelength in vacuum

λ_0

wavelength of an infinite, plane electromagnetic wave propagating in vacuum

NOTE For a wave of frequency f , the wavelength in vacuum is then given by $\lambda_0 = cf$, where $c = 299\,792\,458$ m/s.

1) International Bureau of Weights and Measures (Bureau International des Poids et Mesures).

2) International Federation of Clinical Chemistry and Laboratory Medicine.

3) International Union of Pure and Applied Chemistry.

4) International Union of Pure and Applied Physics.

5) International Organization of Legal Metrology (Organization Internationale de Metrologie Legale).