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colour inside

Display lighting unit –
Part 2-4: Electro-optical measuring methods of laser module

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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DISPLAY LIGHTING UNIT –

Part 2-4: Electro-optical measuring methods of laser module

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International Standard IEC 62595-2-4 has been prepared by IEC technical committee 110: Electronic displays.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
110/1224/FDIS	110/1246/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62595 series, published under the general title *Display lighting unit*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

Laser modules, in general, have been used widely for various applications such as, optical communications, laser beam machining, bar-code reading, optical disc drives and so on. The laser module in this document is limited to display applications. It is a key light source for laser displays, laser backlight/front light units for liquid crystal displays (LCDs), holographic displays and so on. A typical laser module for display applications comprises multiple laser devices, electrical inputs and an optical output combining the outputs of the laser diodes (LDs). The laser device used in the laser module here is an edge-emitting laser diode (LD), a vertical cavity surface-emitting laser diode (VCSEL), or a photon up-conversion laser including second-harmonic generation (SHG).

The optical output is usually provided out of an optical component such as a pigtail fibre, a fibre with a connector, a waveguide, a light guide, or a lens unit for the convenience of users.

In advanced display applications, not only visible laser diodes but also near infrared (near IR) laser diodes are included in the module for sensor applications such as the LiDAR system (light detection and ranging, or laser image detection and ranging).

Therefore, the wavelength range for display applications covers all the visible wavelengths from 380 nm to 780 nm, including the laser diodes for pumping phosphors. That is, a violet laser diode emitting at 405 nm is included. Photometric and colorimetric measurements are the primary focus of this document. The near IR LD for a LiDAR system included in the module can be measured as a monochromatic light output using the light measuring device (LMD) covering the IR wavelength region. However, the measurements of IR lasers are out of the scope of this document.

It is important for the designing of the above display systems and devices to standardise the electro-optical measuring methods of the laser modules. Photometric and colorimetric measurements are particularly important for display applications because each LD has different electrical and optical performances, such as threshold currents, efficiency, spectrum, far field pattern (FFP) of the output laser beam, speckle-related behaviours and their temperature dependence.

Particularly for the colour speckle of the output laser beam, the measured speckle data are very useful to predict the visual quality of laser displays and to design speckle reducing devices.

DISPLAY LIGHTING UNIT –

Part 2-4: Electro-optical measuring methods of laser module

1 Scope

This part of IEC 62595 specifies the electro-optical measuring methods of laser modules with multiple laser devices and an optical output for various displays and display lighting applications which require photometric and colorimetric measurements, covering the wavelength range of 380 nm to 780 nm. The module has multiple laser devices such as edge-emitting laser diodes (LDs), vertical cavity surface-emitting laser diodes (VCSELs), or photon up-conversion laser devices including second-harmonic generation (SHG). The module has an optical output such as an optical fibre, waveguide, light guide, lens unit, or other optics, emitting a laser beam combining the output of the multiple laser devices.

NOTE See 3.1.1 for a definition of a laser device inside the laser module.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

IEC 60825-1, *Safety of laser products – Part 1: Equipment classification and requirements*

IEC 62906-5-2, *Laser display devices – Part 5-2: Optical measuring methods of speckle contrast*

IEC 62906-5-4, *Laser display devices – Part 5-4: Optical measuring methods of colour speckle*

3 Terms, definitions, abbreviated terms, and letter symbols

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1.1
laser device
<of display lighting unit> semiconductor-based or compactly assembled solid-state up-conversion laser

EXAMPLE Edge-emitting laser diode, vertical cavity surface-emitting laser diode, or photon up-conversion laser including second-harmonic generation (SHG), or third-harmonic generation (THG).

Note 1 to entry: See Annex A.