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colour inside

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

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CONTENTS

FOREWORD 6
INTRODUCTION 8
1 Scope 9
2 Normative references 9
3 Terms, definitions, abbreviated terms, and letter symbols 9
3.1 Terms and definitions 9
3.2 Abbreviated terms and letter symbols 11
3.2.1 Abbreviated terms 11
3.2.2 Letter symbols 12
4 Standard measuring conditions 14
4.1 Standard measuring environmental conditions 14
4.2 Standard measuring dark-room conditions 14
4.3 Safety requirements 14
4.4 Standard DUT conditions 15
4.5 Standard LMD requirements 15
4.6 Standard measurement setup and coordinate system 17
5 Measuring methods 20
5.1 General 20
5.2 Current-light output characteristics 21
5.2.1 General 21
5.2.2 I-P_o and I- P_o / P_i characteristics 21
5.2.3 CW and PWM operations 22
5.2.4 Threshold currents (I_{th}) 23
5.2.5 Measurement procedures 24
5.3 Spectra (wavelength) and chromaticity measurements 25
5.3.1 General 25
5.3.2 Measurement procedures 25
5.4 FFP 26
5.4.1 General 26
5.4.2 Monochromatic FFP 26
5.4.3 Colorimetric FFP 27
5.5 Monochromatic speckle and colour speckle 30
5.5.1 General 30
5.5.2 Monochromatic speckle measurement affected by FFP 30
5.5.3 Colour speckle measurement affected by FFP 32
5.6 Temperature dependence 35
5.6.1 General 35
5.6.2 High-power LD module 35
5.6.3 Low-power RGB LD module 36
5.7 High-speed pulse modulation properties 37
5.7.1 General 37
5.7.2 Optical output pulse waveform measurement 37
Annex A (informative) Laser devices 40
A.1 Edge-emitting laser diode 40
A.2 Single- and multi-transverse modes 41
A.3 Single- and multi-longitudinal modes 42

A.4 Vertical cavity surface-emitting laser diode (VCSEL) 43
A.5 Photon up-conversion laser device 45
Annex B (informative) Structure of laser module 46
B.1 Monochromatic laser module 46
B.2 RGB laser module 47
B.3 Other output optics 48
Annex C (informative) Narrow-linewidth emission spectra of laser modules 49
C.1 Spectra of monochromatic high-power LD modules 49
C.2 Spectra of multi-colour, single-longitudinal mode LD modules 51
C.3 Spectra of multi-colour, multi-longitudinal mode LD modules 51
C.4 Chromaticity measurements using a colorimeter 52
Annex D (informative) Chromaticity accuracy when measuring narrow spectral linewidth 53
D.1 General 53
D.2 Wavelength accuracy to keep chromaticity accuracy < 0,001 or < 0,005 53
D.3 Spectral bandwidth to keep chromaticity accuracy < 0,001 55
Annex E (informative) Numerical aperture (NA) of fibre 58
E.1 Fibre NA and maximum divergence angle 58
E.2 Colour-dependence of fibre NA 58
Annex F (informative) Conversion of the spherical and Cartesian coordinate systems 59
Annex G (informative) Centroid wavelength 60
Annex H (informative) Examples of colour speckle pattern on colorimetric FFPs of fibre output 62
H.1 General 62
H.2 Measured FFP 62
Annex I (informative) Temperature dependence of LDs 65
I.1 Formulation of the thermal performance of LD chips 65
I.2 Calculated examples of I-P_o characteristics 66
I.3 Temperature dependence of emitting wavelengths 69
I.4 Temperature dependence of colour speckle and FFP 69
Annex J (informative) Eye diagram 71
J.1 Eye diagram 71
J.2 Examples of measured eye diagrams 72
Bibliography 73

Figure 1 – Measurement setup and coordinate system (spherical) 18
Figure 2 – Measurement setup and coordinate system (Cartesian) 19
Figure 3 – Measurement setup and coordinates for speckle-related optical performance 20
Figure 4 – Example of I-P_o and I- P_o / P_i characteristics 22
Figure 5 – Pulse repetition waveforms of PWM drive with respect to duty cycle 23
Figure 6 – I_{th} and I-P_o characteristics 24
Figure 7 – Example of measured colorimetric FFP 29
Figure 8 – Example of conversion of the measured speckle data on the FFP into data on a uniform pattern 31
Figure 9 – Example of conversion of measured normalised illuminance data of colour speckle on the FFP into data on a uniform pattern 33

Figure 10 – Example of conversion of measured colour speckle chromaticity data on the FFP into data on a uniform pattern 33
Figure 11 – Temperature dependence measurement setup for high-power laser modules 36
Figure 12 – Temperature dependence measurement setup for low-power laser modules 37
Figure 13 – Measurement setup for output pulse waveform 38
Figure 14 – Example of input/output pulse waveforms 38
Figure A.1 – Schematic structure of narrow-stripe edge-emitting laser diode 40
Figure A.2 – Schematic structure of wide-stripe edge-emitting laser diode 41
Figure A.3 – Single- and multi-transverse mode patterns 42
Figure A.4 – Single- and multi-longitudinal mode patterns 42
Figure A.5 – Schematic structure of VCSEL 44
Figure A.6 – VCSEL array 44
Figure A.7 – Conceptual image of photon up-conversion 45
Figure A.8 – Example of SHG laser device emitting at 532 nm 45
Figure B.1 – High-power monochromatic laser module 46
Figure B.2 – High-power RGB laser module 47
Figure B.3 – Low-power RGB laser module 48
Figure B.4 – Other types of optical output 48
Figure C.1 – Superposition of multi-mode structures of three LDs 49
Figure C.2 – Spectral power density $S(\lambda)$ with a resolution of 0,1 nm 50
Figure C.3 – Spectral power density $S(\lambda)$ with a resolution of 1 nm 50
Figure C.4 – Example of RGB single-longitudinal mode spectra 51
Figure D.1 – Calculated wavelength accuracy to keep $|\Delta x|$, $|\Delta y| < 0{,}001$ 54
Figure D.2 – Calculated wavelength accuracy to keep $|\Delta x|$, $|\Delta y| < 0{,}005$ 54
Figure D.3 – Calculated wavelength accuracy to keep $|\Delta u'|$, $|\Delta v'| < 0{,}001$ 55
Figure D.4 – Calculated wavelength accuracy to keep $|\Delta u'|$, $|\Delta v'| < 0{,}005$ 55
Figure D.5 – Assumption for calculating the spectral bandwidth accuracy 56
Figure D.6 – Calculated spectral bandwidth accuracy to keep $|\Delta x|$, $|\Delta y| < 0{,}001$ 56
Figure D.7 – Calculated spectral bandwidth accuracy to keep $|\Delta u'|$, $|\Delta v'| < 0{,}001$ 57
Figure E.1 – Fibre cross-section of MMF (step-index) 58
Figure G.1 – Example of laser spectrum (peak and centroid wavelengths) 60
Figure G.2 – Comparison of chromaticity error distributions between the data obtained by the peak wavelength and the centroid wavelength 61
Figure H.1 – Measured colour speckle patterns on colorimetric FFP for the low-power RGB laser module with an SMF output 62
Figure H.2 – Measured speckle-free colorimetric FFPs for the low-power RGB laser module with an SMF output 63
Figure H.3 – Example of speckled FFPs projected on the standard diffusive screen (x-y plane) out of the MMF of a high-power RGB laser module 63
Figure H.4 – Example of un-speckled FFPs projected on the standard diffusive screen (x-y plane) out of the MMF of a high-power RGB laser module 64
Figure I.1 – Example of temperature dependence of I-P_O characteristics of an LD package 66

Figure I.2 – Example of temperature dependence of I-P_o characteristics of an LD package with higher thermal resistance R_{th} 67

Figure I.3 – Example of temperature dependence of I-P_o characteristics of an LD package for I_{th} = 0,25 (A) and T_0 = 100 (K) 68

Figure I.4 – Example of temperature dependence of output power, P_o, for an RGB laser module 68

Figure I.5 – Example of temperature dependence of R, G, B wavelengths for an RGB laser 69

Figure I.6 – Example of temperature dependence of speckled FFP for an RGB laser 70

Figure J.1 – Example of PRBS 71

Figure J.2 – Example of eye diagram 71

Figure J.3 – Eye diagrams for digital frequencies at 100 MHz, 200 MHz, 300 MHz, and 500 MHz (R channel at I = 38mA) 72

Table 1 – Letter symbols (quantity symbols/unit symbols) 12

Table 2 – Summarised results of the colour speckle measurements (example) 34

Table A.1 – Features of single- and multi-mode LDs 43

Table C.1 – CIE 1931 chromaticity calculated from the higher to the lower resolution spectra 51

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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*