

INTERNATIONAL STANDARD

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**Laser displays –
Part 5-7: Measuring methods of image quality affected by speckle for scanning
laser displays**

**Affichages laser –
Partie 5-7: Méthodes de mesure de la qualité d'image affectée par la tacheture
pour les affichages laser à balayage**





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CONTENTS

FOREWORD	4
INTRODUCTION	6
1 Scope	7
2 Normative references	7
3 Terms, definitions, abbreviated terms, and letter symbols	7
3.1 Terms and definitions	7
3.2 Abbreviated terms	8
3.3 Letter symbols	9
4 Standard measuring conditions	10
4.1 General	10
4.2 Standard measuring environmental conditions	10
4.3 Standard measuring dark-room conditions	10
4.4 Standard DUT conditions	10
4.5 Standard LMD requirements	10
4.6 Screen requirements	12
5 Standard measurement setup and coordinate system	12
5.1 Direct measurement setup	12
5.2 Diffuse reflectance standard measurement	13
5.3 Full-screen measurement	14
6 Measuring methods	15
6.1 Wavelength/spectrum and photometric/colorimetric measurements	15
6.2 Monochromatic speckle contrast and colour speckle	17
6.2.1 General	17
6.2.2 Noise analysis of speckle	17
6.2.3 Measurement procedure	18
6.3 Speckle-affected image resolution	19
6.3.1 Grille patterns	19
6.3.2 Contrast modulation (grille-pattern contrast) under speckle effects	19
6.3.3 Measurement procedure	22
6.3.4 Colour speckle and dynamic colour speckle	23
6.4 Non-uniformity/uniformity	25
6.4.1 General	25
6.4.2 Measurement points	25
6.4.3 Measuring method	25
Annex A (informative) Spectral accuracy for keeping a specific chromaticity accuracy	28
A.1 General	28
A.2 Calculated example of wavelength accuracy	28
Annex B (informative) Conventional contrast modulation (grille-pattern luminance contrast) for displays	29
Annex C (informative) Examples of speckle data for grille patterns	31
Bibliography	33
Figure 1 – Setup and coordinate system of direct illuminance measurements	13
Figure 2 – Setup and coordinate system of diffuse reflectance standard measurements	14
Figure 3 – Setup and coordinate system of full-screen measurements	14

Figure 4 – Example of spectra of single-longitudinal mode RGB lasers	15
Figure 5 – Example of spectrum of multi-longitudinal modes	16
Figure 6 – Grille patterns in both horizontal and vertical directions.....	19
Figure 7 – Measured data of speckled grille pattern and lines along the grille direction.....	21
Figure 8 – Eye-diagram representation of normalized illuminance distribution of speckle	22
Figure 9 – Example of chromaticity distribution for the colour speckle observed in the uniform image region (CIE 1976 plot).....	24
Figure 10 – Example of dynamic colour speckle in a period (CIE 1976 plot).....	25
Figure 11 – Non-uniformity measurement positions (rectangular pattern).....	26
Figure 12 – Non-uniformity measurement positions (grille pattern).....	27
Figure A.1 – Calculated wavelength accuracy to keep $ \Delta u' $, $ \Delta v' < 0,001$	28
Figure B.1 – Example of the measured grille pattern	29
Figure B.2 – Example of C_M plot.....	30
Figure C.1 – Example of visualized 2D-captured data for R, G, B monochromatic speckle, and for colour speckle of colour W (white).....	31
Figure C.2 – Example of C_M -speckle plot under the effects of speckle.....	32
Table 1 – Letter symbols (quantity symbols / unit symbols)	9

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

Draft	Report on voting
110/1366/FDIS	110/1390/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

A list of all parts in the IEC 62906 series, published under the general title *Laser displays*, can be found on the IEC website.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

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INTRODUCTION

Beam-scanning laser displays have specific features which are quite different from full-frame (FF) laser displays using a spatial light modulator (SLM) and other electronic displays.

The image of the beam-scanning laser displays is usually projected on a planar or curved screen. Scanning laser displays that excite or pump full or patterned phosphor layers on a separate screen are excluded. The image pixels are virtually created by high-speed modulation of a scanning laser beam combining at least R, G, B primary colour beams, which is sometimes called "flying spot". Compared with displays with spatial light modulators, the image formed on the screen can have additional spatio-temporal blur and non-uniformities. Therefore, to measure the image quality projected on the screen, the dynamic scan mechanism even for still images is considered.

Furthermore, speckle greatly affects the image quality because a speckle pattern is created on the retina by interference of the coherent or partially coherent laser lights scattered on the screen. It is more difficult for the beam-scanning laser displays to reduce speckle effects than other laser displays. This is because some of the effective speckle-reducing techniques such as moving diffusers and angular compounding are not applicable to a laser beam. Therefore, the speckle more greatly affects the measurements of illuminance, chromaticity and resolution, that is, speckle effects are more dominant in that type of displays and therefore it is necessary to use light measuring equipment designed for measurements under the effect of speckle.

The speckle-affected image quality of scanning laser displays strongly depends on the optical quality of the laser beam, such as scanning speed, scanning angle, image-signal modulation, and speckle. The detail of the measuring methods of the laser beam emitted out of laser modules is specified in IEC 62595-2-4 [1]¹.

¹ Numbers in square brackets refer to the Bibliography.

LASER DISPLAYS –

Part 5-7: Measuring methods of image quality affected by speckle for scanning laser displays

1 Scope

This part of IEC 62906 specifies the standard measurement conditions and methods for determining the quality of images projected by a scanning laser display on a visible light fluorescence-free screen, when observed as being affected by speckle noise due to laser coherence.

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 62471 (all parts), *Photobiological safety of lamps and lamp systems*

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*

IEC 62906-5-6, *Laser displays – Part 5-6: Measuring methods for optical performance of projection screens*

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

scanning laser display

laser display capable of projecting an image on a planar or curved screen by spatially scanning one or several laser beams

3.1.2

raster-scan laser display

laser display capable of projecting an image on a planar or curved screen by scanning one or several laser beams line-by-line