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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

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- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



110/1350/CD

COMMITTEE DRAFT (CD)

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IEC TC 110 : ELECTRONIC DISPLAYS

SECRETARIAT:

Japan

SECRETARY:

Mr Yoshi SHIBAHARA

OF INTEREST TO THE FOLLOWING COMMITTEES:

TC 100

PROPOSED HORIZONTAL STANDARD:

☐

Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.

FUNCTIONS CONCERNED:

☐ EMC

☐ ENVIRONMENT

☐ QUALITY ASSURANCE

☐ SAFETY

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Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE:

Electronic displays – Part 3-6: Evaluation of optical performances – Spatial resolution

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRONIC DISPLAYS –

Part 3-6: Evaluation of optical performance – Spatial resolution

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International Standard IEC 62977-3-6 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
XX/XX/FDIS	XX/XX/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.

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

- 112 • reconfirmed,
- 113 • withdrawn,
- 114 • replaced by a revised edition, or
- 115 • amended.

116

117 The National Committees are requested to note that for this document the stability date
118 is 2025.

119 THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED
120 AT THE PUBLICATION STAGE.

INTRODUCTION

There was a time size of scanned dot drawn on display screen with electron beam contributed display resolution in earlier cathode-ray tube displays. By contrast, pixel is a simple method to estimate display resolution of flat-panel displays which use separate red, green, and blue (RGB) micro-colour-filter elements within each pixel, such as in RGB lattice patterns. In this case, the physical pixel is typically countable. However, some recent display technologies do not use these three colours for each incoming image pixel, thereby obscuring the pixel count. The subpixel rendering, signal rendering, and analogue pixel drive affect the spatial performance of the display. Furthermore, the optical elements used in the display structure affect the spatial imaging performance. For example, a diffusing film can be overlaid on the front surface of a panel to improve the viewing angle and reduce the specular reflection of ambient light. However, such front surface diffusers generate optical interpixel crosstalk and sparkles, which degrade the spatial resolution characteristics of the display. Therefore, the spatial imaging performance of a display is typically not solely determined by the pixel count.

An effective metrological method should be independent of the device architecture and be technologically neutral. Therefore, the pixel can be logically defined by the standard image format of the input/output signal and not by the physical pixel of the device. As an example, the ITU Radio communication Sector (ITU-R) defined the pixel count and sampling lattice for 4K and 8K UHD formats in Recommendation BT.2020 [9]. The unit of the spatial frequency is based on the sampling grid interval standardized in the image format used in the display input signal.

The spatial resolution characteristics indicate how much detail of the input digital images can be reproduced by the display, enabling us to evaluate its spatial imaging performance. The sampling frequency of 1 cycle/pixel is defined by the sampling lattice of the image format. The Nyquist frequency is half of the sampling frequency. For display modulation transfer function (MTF) estimation, the spatial frequency range is limited to 0–0,5 cycles/pixel.

This part of IEC 62977 specifies the standard measurement conditions, measuring and evaluation methods of spatial resolution characteristics of flat panel display devices and display sets. Two measurement methods are covered: the first method involves measuring contrast modulation based on the display response of an alternating line pair input, and the second method involves a line-based MTF measurement. Both measurement results show the spatial resolution characteristics of the display as a function of spatial frequency.

ELECTRONIC DISPLAYS –

Part 3-6: Evaluation of optical performance – Spatial resolution

1 Scope

This part of IEC 62977 specifies the measuring and evaluation methods of spatial resolution using contrast modulation and modulation transfer function (MTF) of flat panel displays.

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.

ISO 9241-305:2008 *Ergonomics of human-system interaction - Part 305: Optical laboratory test methods for electronic visual displays*

IEC 62977-2-1 (2021), *Electronic displays – Part 2-1: Measurements of optical characteristics –Fundamental measurements.*

3 Terms, definitions, and abbreviated terms

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

Michelson contrast

ratio of the luminance amplitude of a periodic pattern, such as grille pattern, to the average luminance

3.1.2

grille pattern

alternating straight line-pair pattern

3.1.3

contrast modulation

grille pattern luminance contrast

Michelson contrast of a moving-window-averaged grille pattern

3.1.4

modulation transfer function

magnitude response of an optical system to sinusoids of different spatial frequencies

3.2 Abbreviated terms

DUT	device under test
LMD	light measurement device
MTF	modulation transfer function
MWA	moving-window average
RGB	red, green, blue
ROI	region of interest