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

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CONTENTS

FOREWORD 4
INTRODUCTION 6
1 Scope 7
2 Normative references 7
3 Terms, definitions, abbreviated terms, letters and symbols 7
3.1 Terms and definitions 7
3.2 Abbreviated terms 8
3.3 Letters and symbols 8
4 Standard measuring equipment 9
4.1 General 9
4.2 Equipment 9
4.2.1 Digital pattern generator 9
4.2.2 Imaging LMD 10
5 Standard measuring conditions 11
5.1 Standard measuring environmental conditions 11
5.2 Standard measuring darkroom conditions 11
5.3 Measurement locations on the screen 11
5.4 Input signal condition 12
6 Display contrast modulation measurement 12
6.1 General 12
6.2 Contrast modulation 12
6.3 Measuring method with grille pattern 12
6.4 Spatial resolution evaluation using contrast modulation 15
7 Display MTF measurement 16
7.1 General 16
7.2 MTF concept for sampled imaging systems 17
7.3 Line-based method 17
8 Reporting 20
Annex A (informative) Evaluation of spatial resolution 21
Annex B (normative) Edge-based LMD MTF measurement 22
Annex C (informative) Precautions for spatial resolution measurement methods 24
C.1 Sampling issues in grille pattern luminance contrast measurement method 24
C.2 Constraints of the grille pattern luminance contrast and the line-based MTF measurement methods 24
C.3 Colour evaluation 25
Annex D (informative) Example of line-based MTF evaluation 26
Annex E (informative) Constraints on curved panel evaluation 29
Bibliography 30

Figure 1 – Diagram of DUT and measurement system 10
Figure 2 – Example of nine measurement locations on DUT screen 11
Figure 3 – Input signal image for grille pattern 13
Figure 4 – Grille pattern examples of signal image on DUT screen 13
Figure 5 – Example of luminance profile 14
Figure 6 – Evaluation of contrast modulation measurement 16

Figure 7 – Schematic of the display MTF measurement setup 17
Figure 8 – Intermediate results obtained at different points in the MTF measurement process 19
Figure A.1 – Example image of luminance profile 21
Figure B.1 – Schematic of the edge-based LMD MTF measurement setup 22
Figure B.2 – Flow diagram of the edge-based LMD MTF measurement process 23
Figure C.1 – Examples of display physical sub-pixel arrangements 25
Figure D.1 – Computer-generated 200 (W) × 200 (H)-pixel images of a vertical line displayed on the screen with the RGB-stripe array having the MTF of $|\mathrm{sinc}(\xi_{x,LMD}, \xi_{y,LMD})|^3$ for pixel ratios of 2 and 7 26
Figure D.2 – RGB stripe arrangement: Layout of the micro-colour-filter array and vertically averaged luminance profile 26
Figure D.3 – Reference display MTF 27
Figure D.4 – Flowchart of the algorithm for the line-based display MTF measurement 27
Figure D.5 – Slanted line image captured by LMD (left) and obtained LSF (right) 28

Table 1 – Symbols in this document 9

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

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

Draft	Report on voting
110/1752/FDIS	110/1769/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.

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/publications.

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

- reconfirmed,
- withdrawn, or
- revised.

INTRODUCTION

Historically, the size of a scanned dot drawn on a cathode-ray tube display with an electron beam was the main contributor to the display spatial resolution. Later, the pixel geometry of a conventional flat-panel display with red, green and blue (RGB) colour-filter elements in each pixel, such as RGB stripes, provides a simple metric to accurately estimate the display resolution. However, some recent display technologies use other subpixel arrangements or additional subpixel colours to render each incoming image pixel, thereby obscuring the pixel count, and the subpixel rendering affects 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 direction performance and reduce the specular reflection of ambient light. However, such front surface diffusers generate optical interpixel crosstalk and sparkle, 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.

It is important for an effective metrological method to be technologically agnostic and independent of the device architecture. Therefore, the pixel used in the spatial frequency unit of cycles/pixel can be logically defined by the standard image format of the input/output signal and not by the physical pixel structure of the device. The unit of the spatial frequency is based on the sampling grid interval standardized in the image format used in the display input signal.

NOTE The ITU Radio communication Sector (ITU-R) defined the pixel count and sampling lattice for 4K and 8K UHD formats in recommendation BT.2020 [1][1].

The spatial resolution characteristics indicate spatial imaging performance of a display by evaluating the reproduction of input digital images by the display.

There are two measurement methods covered in this document. The first method involves measuring the contrast based on the display response of an alternating line pair input, and the second method involves a line-based modulation transfer function (MTF) measurement. Both measurement results show the spatial resolution characteristics of the flat panel display (see Annex E) as a function of spatial frequency.

[1] Numbers in square brackets refer to the Bibliography.

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 of flat panel emissive displays, by determining their contrast modulation and modulation transfer function (MTF).

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 cited edition applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 12233*, Photography – Electronic still picture imaging – Resolution and spatial frequency responses*