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

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IEC 62977-3-6 has been prepared by IEC technical committee 110: Electronic displays. It is an International Standard.

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.

A list of all parts in the IEC 62977 series, published under the general title *Electronic Displays*, 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 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- withdrawn, or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*