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Edition 1.0 2024-03

INTERNATIONAL STANDARD

colour inside

Electronic displays –
Part 2-7 : Measurements of optical characteristics – Tiled displays



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ELECTRONIC DISPLAYS –

Part 2-7: Measurements of optical characteristics – Tiled displays

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

Draft	Report on voting
110/1614/FDIS	110/1631/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- withdrawn, or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.

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INTRODUCTION

Tiled displays are widely used in a variety of places and in a variety of forms. Demand for tiled displays is expected to increase in the future. IEC TC 110 has already standardized various measurement methods to evaluate performance of electronic displays. However, in order to evaluate the performance of a tiled display, additional definitions of terms and new evaluation methods will be developed.

The tiled display has repeatable elements that exist at various levels whose subsystems enable a highly configurable display system. In terms used in LED industries, for example the display system (first level of assembly) includes all subcomponents. It can come in any shape or size, curved, disconnected, etc. The cabinet (second level of assembly) typically includes a mechanical support structure with mechanical interconnects. The cabinet is also called a panel, chassis, or shell. The module (third level of assembly) typically includes optical elements (lowest level of assembly) with electrical interconnects, but will probably not have module-to-module mechanical interconnects. The module is also called a tile. As described above, the tiled display consists of a combination of subsystems of each level as illustrated in Figure 1. In this combination process, problems that did not appear on a single panel display can occur. Therefore, the optical properties caused by this problem will be checked at each level.

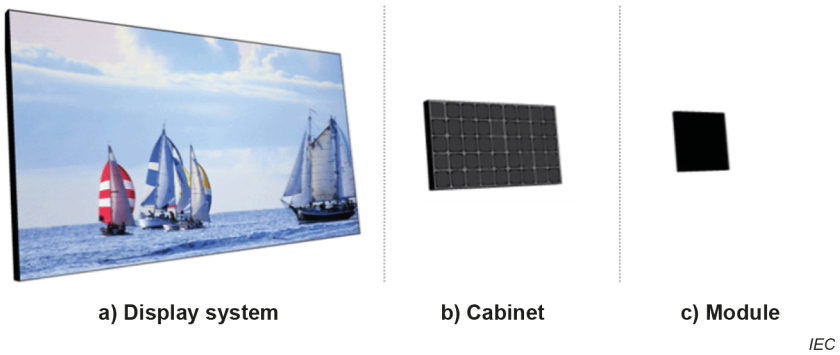


Figure 1 – Example of tiled display system

Depending on the final installation location, the methods presented in this document will probably not be applicable, and the result can vary depending on the calibration process reflecting the final installation environment.

This document deals with a tiled display performance evaluation method based on the existing TC 110 measurement method.

ELECTRONIC DISPLAYS –

Part 2-7: Measurements of optical characteristics – Tiled displays

1 Scope

This part of IEC 62977 specifies standard measuring conditions and measurement methods for determining the optical characteristics of tiled displays which consist of multiple display modules in order to form one screen. These methods apply to emissive and transmissive direct view flat displays that render real 2D images with all modules lying in the same plane. The methods are applicable in environments where the measuring conditions can be controlled, such as laboratory and production testing.

NOTE The measurement results are not specific values for the products. They can vary according to the measurement method and light measuring device (LMD) used in the calibration.

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

IEC 62977-2-2:2020, *Electronic displays – Part 2-2: Measurements of optical characteristics – Ambient performance*

IEC 62341-6-2:2015, *Organic light emitting diode (OLED) displays – Part 6-2*: *Measuring methods of visual quality and ambient performance*

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 terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1.1
tiled display
display which consists of multiple display modules in order to form one screen

3.1.2
seam
space or gap between the adjacent display device modules

Note 1 to entry: Seam can result from the gaps between adjacent pixels on adjacent devices, and from any components (e.g., interconnects, adhesives, seals, mechanical alignment components, etc.) of a frame outside the device, making the display image discontinuous.

Note 2 to entry: In the case of some tiled display products, additional lens, narrow pitch, and overlapping technologies are used to produce a seamless display with a seam that is not perceptible to the user. Such a seam is called an invisible seam.

3.1.3
tiled display element
single device element of the tiled display that can be driven independently and capable of providing an independent visual representation

Note 1 to entry: Among the assembly levels exemplified in the introduction, cabinets and modules would belong to tiled display elements. However, the case of the module, which cannot be operated independently, is excluded.

3.1.4
pixel ratio
number of pixels of the output image of the LMD per pixel interval of the image of the display input, when the display screen is captured by the LMD at a specific magnification

3.2 Abbreviated terms

CIE Commission Internationale de l'Eclairage (International Commission on Illumination)

CPX camera pixel

DUT device under test

ILMD imaging light measuring device

LMD light measuring device

MWA moving-window average

4 Standard measuring equipment

4.1 Light measuring devices

For the requirements of light measuring devices, refer to those specified in IEC 62977-2-1. The system configurations, operating conditions, or both, of the measuring equipment shall comply with the structure specified in each item. In particular, 6.2 and 6.3 shall follow the conditions of IEC 62977-2-1:2021, 5.3.4.

For 2D ILMDs which are not covered by 62977-2-1, the following requirements apply to the light measuring equipment, as follows.

2D ILMD: The ILMD shall capture a displayed image at a certain exposure time. The ILMD shall be used within its linear range for the incoming light. If a 2D ILMD is used, the effect of moiré, LMD field of view, flat field correction, background subtraction, etc., shall be taken into account. The measurement method in this document only measures a small area of the display, not the entire display, so moiré is not likely to occur, but should be checked before measurement. One display pixel should be covered by 30 or more camera pixels to avoid it. Refer to [1][1], Chapter 7, Appendix A9, for more information.

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