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TECHNICAL SPECIFICATION

Organic light emitting diode (OLED) displays PREVIEW Part 6-5: Measuring methods of dynamic range properties

> <u>IEC TS 62341-6-5:2019</u> https://standards.iteh.ai/catalog/standards/sist/3d714a67-d117-4678-a6edd1b309a5ec9f/iec-ts-62341-6-5-2019





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IEC Central Office 3, rue de Varembé CH-1211 Geneva 20 Switzerland Tel.: +41 22 919 02 11 info@iec.ch www.jec.ch

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ORGANIC LIGHT EMITTING DIODE (OLED) DISPLAYS -

Part 6-5: Measuring methods of dynamic range properties

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- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC TS 62341-6-5, which is a technical specification, has been prepared by IEC technical committee 110: Electronic displays.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
110/1017/DTS	110/1063A/RVC

Full information on the voting for the approval of this technical specification 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.

A list of all parts in the IEC 62341 series, published under the general title Organic light emitting diode (OLED) 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 "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed. •
- withdrawn, .
- replaced by a revised edition, or
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A bilingual version of this publication may be issued at a later date.

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ORGANIC LIGHT EMITTING DIODE (OLED) DISPLAYS -

Part 6-5: Measuring methods of dynamic range properties

1 Scope

This part of IEC 62341 specifies the standard measurement conditions and dynamic range properties for OLED display panels and modules. More precisely, this document focuses on the specific aspects of the dynamic range properties.

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 62341-1-2:2014, Organic light emitting diode (OLED) displays – Part 1-2: Terminology and letter symbols

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3 Terms, definitions, and abbreviated terms en.ai)

3.1 Terms and definitions

IEC TS 62341-6-5:2019

For the purposes of this document, the terms and definitions given in 1EC 62341-1-2 and the following 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

dynamic range coverage

capability of the representable dynamic range relative to the reference input signal

EXAMPLE IEC sRGB, BT.1886, BT.2100, BT.2020, SMPTE ST.2084.

3.2 Abbreviated terms

- APL average picture level
- CIE Commission Internationale de l'Eclairage (International Commission on Illumination)
- DUT device under test
- LMD light measuring device

4 Standard measuring equipment and coordinate system

4.1 Light measuring devices

The system configurations and/or operating conditions of the measuring equipment shall comply with the structure specified for each item.

To ensure reliable measurements, the following requirements apply to the light measuring equipment:

- 1) Luminance meter[1]1: the instrument's spectral responsivity shall comply with the CIE photopic luminous efficiency function with a CIE- f_1 value no greater than 3 % [2].
- 2) Spectroradiometer: the wavelength range shall be at least from 380 nm to 780 nm, and the wavelength scale accuracy shall be less than \pm 0,5 nm.

Errors from spectral stray light within a spectroradiometer can be significant and shall be corrected. A simple matrix method may be used to correct the stray light errors, by which stray light errors can be reduced by one to two orders of magnitudes. Details of this correction method are discussed in the referred document [3]. If the obtained luminance is lower than the LMD limitation, the lower limit of the LMD shall be recorded with the measured luminance.

3) Gonio photometric systems: the DUT or LMD can be driven by rotating around a horizontal axis and vertical axis; angle accuracy shall be better than 0,5°.

Care shall be taken to ensure that the LMD has enough sensitivity and dynamic range to perform the required task. Before measuring the DUT, the LMD specification shall be checked.

Low luminance measurement is very important for dynamic measurement.

4.2 Viewing direction coordinate system

The viewing direction is the direction under which the observer looks at the spot of interest on the DUT (see also IEC 62341-1-2:2014, Figure A.2). During the measurement, the LMD replaces the observer, looking from the same direction at a specified spot (i.e. measuring spot, measurement field) on the DUT. The viewing direction is conveniently defined by two angles: the angle of inclination θ (related to the surface normal of the DUT) and the angle of rotation ϕ (also called azimuth angle) as illustrated in Figure 21.9 The azimuth angle is related to the directions on a watch-dial as follows: $\phi = 0^{\circ}$ is referred to as the 3-6 clock direction ("right"), $\phi = 90^{\circ}$ as the 12-o'clock direction ("top"), $\phi = 2180^{\circ}$ as the 9-o'clock direction ("left") and $\phi = 270^{\circ}$ as the 6-o'clock direction ("bottom").

¹ Numbers in square brackets refer to the Bibliography.



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Key <u>IEC TS 62341-6-5:2019</u>

3 o'clock: right edge of the screen as seen by the user dlb309a5ec9t/ec-ts-62341-6-5-2019

6 o'clock: bottom edge of the screen as seen by the user

9 o'clock: left edge of the screen as seen by the user

12 o'clock: top edge of the screen as seen by the user

NOTE This is equivalent to the direction of measurement by the angle of inclination, θ , and the angle of rotation (azimuth angle), ϕ , in a polar coordinate system.

Figure 1 – Representation of the viewing direction

5 Measuring conditions

5.1 Standard measuring environmental conditions

Measurements shall be carried out under the following standard environmental conditions:

_	temperature:	25 °C ± 3 °C,
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- relative humidity:
 25 % RH to 85 % RH,
- atmospheric pressure: 86 kPa to 106 kPa.

When different environmental conditions are used, they shall be noted in the measurement report.

5.2 Power supply

The power supply for driving the DUT shall be adjusted to the rated voltage ± 0.5 %. In addition, the frequency of the power supply shall provide the rated frequency ± 0.2 %.

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5.3 Warm-up time

Measurements shall be carried out after sufficient warming up. Warm-up time is defined as the time elapsed from when the supply source is switched on, and a 100 % grey level of input signal is applied to the DUT, until repeated measurements of the display show a variation in luminance of no more than 2 %/min and 5 %/h.

5.4 Standard measuring dark-room conditions

The luminance contribution from the background illumination reflected off the test display shall be less than 0,01 lx. If these conditions are not satisfied, then background subtraction is required and it shall be noted in the measurement report. In addition, if the sensitivity of the LMD is inadequate to measure these low levels, then the lower limit of the LMD shall be noted in the measurement report.

5.5 Standard set-up conditions

By default, the display shall be installed in the vertical position (Figure 2a)), but the horizontal alternative (Figure 2b)) is also allowed. When the latter alternative is used, it shall be noted in the measurement report.

Luminance, contrast ratio and chromaticity of the white field and other relevant parameters of the displays have to be adjusted to nominal status in the detailed specification and they shall be noted in the measurement report. When there is no level specified, the maximum contrast and/or luminance level shall be used. These adjustments shall be held constant for all measurements, unless noted otherwise in the measurement report. Additional conditions are specified separately for each measuring method.



a) Primary installation

b) Alternative installation

Figure 2 – DUT installation conditions

6 Measuring methods of dynamic range properties

6.1 Peak luminance

6.1.1 Purpose

The purpose of this method is to evaluate luminance with size-varying peak size in the perpendicular, horizontal and vertical viewing direction.

NOTE The white luminance can be varied by the power management function depending on the APL loading of the display. The peak luminance measured in small area highlights can exhibit a different luminance than larger area patches with the same input signal. For multi-primary displays, the peak luminance of the highlights can be enhanced by boosting the white luminance beyond the sum of the individual RGB primaries, while still maintaining the white chromaticity.