

# INTERNATIONAL STANDARD



---

## Organic light emitting diode (OLED) displays – Part 6-3: Measuring methods of image quality

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

---

ICS 31.260

ISBN 978-2-8322-4977-2

**Warning! Make sure that you obtained this publication from an authorized distributor.**

## CONTENTS

FOREWORD .....	4
1 Scope .....	6
2 Normative references .....	6
3 Terms, definitions, and abbreviated terms .....	6
3.1 Terms and definitions.....	6
3.2 Abbreviated terms.....	7
4 Standard measuring equipment and coordinate system .....	7
4.1 Light measuring device .....	7
4.2 Viewing direction coordinate system .....	8
4.3 Standard measuring environmental conditions .....	9
4.4 Power supply .....	9
4.5 Warm-up time .....	10
4.6 Standard measuring dark-room conditions .....	10
4.7 Standard set-up conditions .....	10
5 Measuring methods .....	10
5.1 Measuring methods for spatial image quality.....	10
5.1.1 Viewing angle .....	10
5.1.2 Colour characteristics .....	17
5.1.3 Crosstalk .....	22
5.1.4 Static image resolution .....	25
5.2 Measuring methods for temporal image quality .....	30
5.2.1 Flicker .....	30
5.2.2 Grey-to-grey response time .....	34
Annex A (informative) Simple matrix method for correcting the stray light of imaging instruments .....	36
A.1 Purpose .....	36
A.2 Measuring method .....	36
Annex B (informative) Measuring the moving picture perceptual resolution of a display .....	38
B.1 Purpose .....	38
B.2 Measuring conditions .....	38
B.2.1 Measuring equipment .....	38
B.2.2 Requirements for the camera system.....	38
B.2.3 Requirements for test pattern .....	38
B.2.4 Parameters for measuring condition .....	40
B.2.5 Measurement procedure .....	40
Bibliography.....	42
Figure 1 – Representation of the viewing direction .....	9
Figure 2 – DUT installation conditions.....	10
Figure 3 – Conceptual geometry used for measuring the viewing angle range.....	11
Figure 4 – 4 % window pattern for half luminance angle.....	12
Figure 5 – Test pattern for gamma measurement.....	14
Figure 6 – Example of linear regression of $\log(\Delta L_i)$ versus $\log(\Delta V_j)$ at normal direction ( $0^\circ$ ).....	15
Figure 7 – 4 % window pattern for measuring the ‘red’ primary colour.....	18

Figure 8 – 4 % window pattern for each $G$ , $B$ , $C$ , $M$ , $Y$ colour .....	18
Figure 9 – Test pattern for gamut change of the colour scale .....	20
Figure 10 – Example of the measurement results .....	21
Figure 11 – Test pattern for colour desaturation .....	22
Figure 12 – Standard measurement positions .....	23
Figure 13 – Luminance measurement of 4 % window at $P_0$ .....	23
Figure 14 – Luminance measurement at $P_0$ with windows $A_{W1}$ , $A_{W2}$ , $A_{B3}$ , and $A_{B4}$ .....	24
Figure 15 – Luminance measurement at $P_0$ with windows $A_{W5}$ , $A_{W8}$ , $A_{B5}$ and $A_{B8}$ .....	25
Figure 16 – Test pattern for effective resolution .....	26
Figure 17 – Example of luminance window for one-line gridded input .....	28
Figure 18 – Contrast modulation measurement .....	29
Figure 19 – Apparatus arrangement .....	30
Figure 20 – Temporal contrast sensitivity function .....	32
Figure 21 – Example of flicker modulation waveform .....	33
Figure 22 – Example of response time waveform .....	35
Figure A.1 – Result of spatial stray light correction for an imaging photometer .....	37
Figure B.1 – Example of grey levels .....	39
Figure B.2 – Example of frequency based on full HD resolution .....	39
Figure B.3 – Example of test signal for full HD .....	40
Figure B.4 – Example of captured image and one-dimensional data .....	41
Figure B.5 – Example of motion blur threshold point .....	41
Table 1 – Working example for gamma distortion from viewing direction .....	15
Table 2 – Reference areas for the colour reproduction range .....	16
Table 3 – Example of measurement results for colour fidelity .....	20
Table 4 – Example of measurement results for gamut change of colour scale .....	20
Table 5 – Example of measurement results for 1 x 1 gridded colour desaturation .....	21
Table 6 – Temporal contrast sensitivity function .....	31
Table 7 – Example of reporting form of grey-to-grey response time .....	35
Table B.1 – Six different grey levels .....	39

# INTERNATIONAL ELECTROTECHNICAL COMMISSION

---

## ORGANIC LIGHT EMITTING DIODE (OLED) DISPLAYS –

### Part 6-3: Measuring methods of image quality

#### FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62341-6-3 has been prepared by IEC technical committee 110: Electronic display devices.

This second edition cancels and replaces the first edition published in 2012. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) the measuring method for viewing angle has been modified. Measurement of the half luminance angle, gamma distortion, and directional colour variation is added;
- b) measurement method for colour characteristics is added;
- c) additional explanation is added in static image resolution clause;
- d) moving image resolution clause has been moved to Annex B.

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

FDIS	Report on voting
110/901/FDIS	110/923/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.

A list of all the parts in the IEC 62341 series, 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
- amended.

A bilingual version of this publication may be issued at a later date.

The contents of the corrigendum of October 2019 have been included in this copy.

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

## **ORGANIC LIGHT EMITTING DIODE (OLED) DISPLAYS –**

### **Part 6-3: Measuring methods of image quality**

#### **1 Scope**

This part of IEC 62341 specifies the standard measurement conditions and measuring methods for determining the image quality of organic light emitting diode (OLED) display panels and modules.

#### **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*