

Organic Light Emitting Diode (OLED) displays -- Part 5-3: Measuring methods of image sticking and lifetime

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 62341-5-3:2013 sisaldab Euroopa standardi EN 62341-5-3:2013 ingliskeelset teksti.	This Estonian standard EVS-EN 62341-5-3:2013 consists of the English text of the European standard EN 62341-5-3:2013.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 18.10.2013.	Date of Availability of the European standard is 18.10.2013.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 31.120, 31.260

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:
Aru 10, 10317 Tallinn, Eesti; www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:
Aru 10, 10317 Tallinn, Estonia; www.evs.ee; phone 605 5050; e-mail info@evs.ee

**Organic Light Emitting Diode (OLED) displays -
Part 5-3: Measuring methods of image sticking and lifetime
(IEC 62341-5-3:2013)**

Afficheurs à diodes électroluminescentes
organiques (OLED) -
Partie 5-3: Méthodes de mesure de la
durée de vie et de la rémanence d'images
(CEI 62341-5-3:2013)

Anzeigen mit organischen Leuchtdioden
(OLED) -
Teil 5-3: Messverfahren für Nachbilder
und Lebensdauer
(IEC 62341-5-3:2013)

This European Standard was approved by CENELEC on 2013-09-30. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 110/474/FDIS, future edition 1 of IEC 62341-5-3, prepared by IEC/TC 110 "Electronic display devices" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62341-5-3:2013.

The following dates are fixed:

- latest date by which the document has to be (dop) 2014-06-30
implemented at national level by
publication of an identical national
standard or by endorsement
- latest date by which the national (dow) 2016-09-30
standards conflicting with the
document have to be withdrawn

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 62341-5-3:2013 was approved by CENELEC as a European Standard without any modification.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050	Series	International Electrotechnical Vocabulary (IEV)	-	-
IEC 61966-2-1	1999	Multimedia systems and equipment - Colour measurement and management - Part 2-1: Colour management - Default RGB colour space - sRGB	EN 61966-2-1	2000
IEC 62087	2011	Methods of Measurement for the power consumption of audio, video and related equipment	EN 62087	2012
IEC 62341-1-2	2007	Organic light emitting diode displays - Part 1-2: Terminology and letter symbols	EN 62341-1-2	2009
IEC 62341-6-1	2009	Organic light emitting diode (OLED) displays - Part 6-1: Measuring methods of optical and electro-optical parameters	EN 62341-6-1	2011
CIE 15	2004	Colorimetry	-	-

CONTENTS

FOREWORD.....	4
1 Scope.....	6
2 Normative references	6
3 Terms and definitions	6
4 Measuring configuration	7
4.1 General.....	7
4.2 Light measuring device (LMD).....	7
5 Standard measuring conditions.....	7
5.1 Standard measuring environmental conditions.....	7
5.2 Standard measuring dark-room condition	7
5.3 Standard setup conditions	7
5.3.1 General.....	7
5.3.2 Adjustment of OLED display modules	8
5.3.3 Starting conditions of measurements	8
5.3.4 Test patterns	8
5.3.5 Conditions of measuring equipment.....	9
6 Measuring methods of image sticking	9
6.1 Purpose.....	9
6.2 Measuring method.....	9
6.2.1 Measuring equipment	9
6.2.2 Measuring procedure.....	9
6.3 Analysis and report	10
6.3.1 Analysis.....	10
6.3.2 Report	12
7 Measuring methods of the luminance lifetime	13
7.1 Purpose.....	13
7.2 Measuring method.....	13
7.2.1 Measuring equipment	13
7.2.2 Measuring procedure	13
7.2.3 Estimation of luminance lifetime	14
7.3 Analysis and report	15
Annex A (informative) Calculation method of equivalent signal level	17
Annex B (informative) Acceleration test of lifetime measurement	23
Bibliography.....	26
Figure 1 – Measuring system and arrangement.....	7
Figure 2 – Test pattern for image sticking	9
Figure 3 – An example of the burn-in image.....	10
Figure 4 – An example of luminance behavior in operation for an OLED display panel or module	14
Figure 5 – An example of lifetime estimation with the extrapolation method	15
Figure 6 – An example of estimated lifetime depending on the time elapsed	15
Figure 7 – An example of Weibull distribution of lifetime	16
Figure A.1 – Measured 10 mA/cm ² to 80 mA/cm ² OLED degradation values and corresponding modelled functions with $m = 1/1,7$	18

Figure A.2 – Accumulated colour intensity of IEC 62087:2011 10-min video loop in RGB subpixel format with equivalent signal distribution chart based on the left images, respectively	21
Figure A.3 – Accumulated colour intensity of the IEC 62087:2011 10-min video loop in W, R, G, and B format, with equivalent signal distribution chart based on the left images, respectively	22
Figure B.1 – Examples of Weibull distributions of accelerated lifetime test.....	23
Table 1 – An example of measuring distance and radius size.....	8
Table 2 – An example of typical value.....	12
Table 3 – An example of the image sticking time with reference.....	13
Table 4 – An example of the image sticking data at target time	13
Table 5 – Examples of lifetime measurement	16
Table A.1 – Examples of the maximum and the minimum equivalent signal levels (8 bits)	20
Table B.1 – Summary of the acceleration test results in Figure B.1	24
Table B.2 – Statistical analysis results of the accelerated lifetime test in Figure B.1	24

a preview generated by EVS

ORGANIC LIGHT EMITTING DIODE (OLED) DISPLAYS –

Part 5-3: Measuring methods of image sticking and lifetime

1 Scope

This part of IEC 62341 specifies the standard measurement conditions and measurement methods for determining the image sticking and lifetime of organic light emitting diode (OLED) display panels and modules. It mainly applies to modules.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050 (all parts), *International Electrotechnical Vocabulary* (available at <http://www.electropedia.org>)

IEC 62087:2011, *Methods of measurement for the power consumption of audio, video and related equipment*

IEC 62341-1-2:2007, *Organic light emitting diode (OLED) displays – Part 1-2: Terminology and letter symbols*

IEC 62341-6-1:2009, *Organic light emitting diode (OLED) displays – Part 6-1: Measuring methods of optical and electro-optical parameters*

IEC 61966-2-1:1999, *Multimedia systems and equipment – Colour measurement and management – Part 2-1: Colour management – Default RGB colour space – sRGB*

CIE 15-2004, *Colorimetry*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62341-1-2:2007 and IEC 60050-845:1987, as well as the following apply.

3.1

equivalent current density

average current density of a certain pixel calculated from a varying luminance per frame image in a moving picture so that luminance degradation becomes similar at the same time

Note 1 to entry: See Annex A.

3.2

equivalent signal level

digital code value from 0 to 255 (in the case of 8 bits) transformed from the normalized luminance of a certain pixel by a gamma function

Note 1 to entry: See Annex A.