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Liquid crystal display devices - Part 30-1: Measuring methods for liquid crystal display modules - Transmissive type

Flüssigkristall-Anzeige-Bauelemente - Teil 30-1 Messverfahren für Flüssigkristall-Anzeigemodule - Transmissive Ausführung

Dispositifs d'affichage à cristaux liquides - Partie 30-1: Méthodes de mesure pour les modules d'affichage à cristaux liquides - Type transmissif

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English version

**Liquid crystal display devices -
Part 30-1: Measuring methods for liquid crystal display modules -
Transmissive type
(IEC 61747-30-1:2012)**

Dispositifs d'affichage à cristaux liquides -
Partie 30-1: Méthodes de mesure pour les
modules d'affichage à cristaux liquides -
Type transmissif
(CEI 61747-30-1:2012)

Flüssigkristall-Anzeige-Bauelemente -
Teil 30-1 Messverfahren für Flüssigkristall-
Anzeigemodule -
Transmissive Ausführung
(IEC 61747-30-1:2012)

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

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Foreword

The text of document 110/364/FDIS, future edition 1 of IEC 61747-30-1, prepared by IEC/TC 110 "Electronic display devices" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61747-30-1:2012.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2013-04-30
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2015-07-30

This document supersedes EN 61747-6:2004.

EN 61747-30-1:2012 includes the following significant technical changes with respect to EN 61747-6:2004:

- a) the document structure was brought in line with EN 61747-6-2; and
- b) various technical and editorial changes were made.

This standard is to be read in conjunction with EN 61747-1:1999, to which it refers, which gives details of the quality assessment procedures, the inspection requirements, screening sequences, sampling requirements, and the test and measurement procedures required for the assessment of liquid crystal display modules.

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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	-	-
IEC 61747-1	-	Liquid crystal and solid-state display devices - Part 1: Generic specification	EN 61747-1	-
IEC 61747-6-2	-	Liquid crystal display devices - Part 6-2: Measuring methods for liquid crystal display modules - Reflective type	EN 61747-6-2	-
ISO 9241-307	-	Ergonomics of human-system interaction - Part 307: Analysis and compliance test methods for electronic visual displays	EN ISO 9241-307	-
ISO 11664-2	-	Colorimetry - Part 2: CIE standard illuminants	EN ISO 11664-2	-
CIE 15	2004	Colorimetry	-	-

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INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Liquid crystal display devices –
Part 30-1: Measuring methods for liquid crystal display modules – Transmissive
type**

**Dispositifs d'affichage à cristaux liquides –
Partie 30-1: Méthodes de mesure pour les modules d'affichage à cristaux
liquides – Type transmissif**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LIQUID CRYSTAL DISPLAY DEVICES –

**Part 30-1: Measuring methods for liquid crystal display modules –
Transmissive type**

FOREWORD

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International Standard IEC 61747-30-1 has been prepared by IEC technical committee 110: Electronic display devices.

This first edition cancels and replaces IEC 61747-6 published in 2004. This edition constitutes a technical revision.

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

- a) the document structure was brought in line with 61747-6-2; and
- b) various technical and editorial changes were made.

The text of this standard is based on the following documents:

FDIS	Rapport de vote
110/364/FDIS	110/380/RVD

Full information on the voting for the approval on this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all the parts in the IEC 61747 series, under the general title *Liquid crystal display devices*, can be found on the IEC website.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

This standard is to be read in conjunction with IEC 61747-1 (1998), to which it refers, which gives details of the quality assessment procedures, the inspection requirements, screening sequences, sampling requirements, and the test and measurement procedures required for the assessment of liquid crystal display modules.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

In order to achieve a useful and uniform description of the performance of liquid crystal display (LCD) devices, specifications for commonly accepted relevant parameters are put forward. These fall into the following categories:

- a) general type specification (e.g. pixel resolution, diagonal, pixel layout);
- b) optical specification (e.g. contrast ratio, response time, viewing-direction, crosstalk, etc.);
- c) electrical specification (e.g. power consumption, electromagnetic compatibility);
- d) mechanical specification (e.g. module geometry, weight);
- e) specification of passed environmental endurance test;
- f) specification of reliability and hazard / safety.

In most of the cases a) to f), the specification is self-explanatory. For some specification points however, notably in the area of optical and electrical performance, the specified value may depend on the measuring method.

The purpose of this standard is to indicate and list the procedure-dependent parameters and to prescribe the specific methods and conditions that are to be used for their uniform numerical determination. It is assumed that all measurements are performed by personnel skilled in the general art of radiometric and electrical measurements as the purpose of this standard is not to give a detailed account of good practice in electrical and optical experimental physics. Furthermore, it shall be assured that all equipment is suitably calibrated as is known to people skilled in the art and records of the calibration data and traceability are kept.

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LIQUID CRYSTAL DISPLAY DEVICES –

Part 30-1: Measuring methods for liquid crystal display modules – Transmissive type

1 Scope

This part of IEC 61747 is restricted to transmissive liquid crystal display-modules using either segment, passive or active matrix and achromatic or colour type LCDs. Furthermore, the transmissive modes of transfective LCD modules with backlights ON are comprised in this document. An LCD module in combination with a touch-panel or a front-light-unit is excluded from the scope because measurements are frequently inaccurate. Touch-panels or front-light-units are removed before measurement. Throughout the main body of this standard, an integrated backlight is assumed to provide the illumination for the measurements. Deviations from this (e.g. segmented displays without integrated backlights) may usually be handled in the same way as display modules with integrated backlight, if an external backlight is provided. However, in the case where one of the two situations should be handled differently, this will be specifically stated.

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 61747-1, *Liquid crystal and solid-state display devices – Part 1: Generic specification*

IEC 61747-6-2, *Liquid crystal display devices – Part 6-2: Measuring methods for liquid crystal display modules – Reflective type*

ISO 9241-307, *Ergonomics of human-system interaction – Part 307: Analysis and compliance test methods for electronic visual displays*

ISO 11664-2 (CIE S 014-2/E:2006), *Colorimetry – Part 2: CIE Standard illuminants*

CIE 15-2004, *Colorimetry*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-845:1987 apply.

NOTE Several points of view with respect to the preferred terminology on "monochrome", "achromatic", "chromatic", "colour", "full-colour", etc. can be encountered in the field amongst spectroscopists, physicists, colour-perception scientists, physical engineers and electrical engineers. In general, all LCDs demonstrate some sort of chromaticity (e.g. as a function of viewing angle, ambient temperature or externally addressable means). Pending detailed official description of the subject, the pre-fix pertaining to the "chromaticity" of the display will be used so

as to describe the colour capability of the display that is externally (and electrically) addressable by the user. This leads us to the following definitions (see also IEC 61747-6-2):

- a) a monochrome display has no user-addressable chromaticity ("colours"). It may or may not be "black and white" or a-chromatic;
- b) a colour display has at least two user-addressable chromaticities ("colours"). A full-colour display has at least three user addressable primary colours with at least 6 bits per primary colour ($\geq 260\,000$ colours).

3.2 Abbreviations

CFF	critical flicker frequency
CR	contrast ratio
CR _{PF}	Plain Field Contrast Ratio
DUT	device under test
FFT	fast Fourier transform
GSI	gray-scale inversion
HXT	horizontal crosstalk
LCD	liquid crystal display
LMD	light measuring device
LNU	long range non-uniformity
PWM	pulse width modulation
UCS	uniform colour space
VAR	viewing angle range
VXT	vertical crosstalk
XT	crosstalk

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4 Illumination and illumination geometry

4.1 General comments and remarks on the measurement of transmissive LCDs

Transmissive LCDs often make use of their own integrated source of backlight illumination to display visual information. It is difficult to achieve the required significance and reproducibility of the results of measurements because of the close coupling between the backlight illumination system, the LMD and DUT. In the cases where the backlight unit is not static, care shall be taken that the behaviour of the backlight is known, and measurements are taken making sure there is no interference between backlight temporal variations (e.g. by PWM signal or dynamic backlight), DUT addressing frequency and LMD sampling frequency. The luminance and colour of the backlight at the moment of measurement shall be specified and backlight operation shall be static and stable during the period of measurement.

The temporal drift in backlight luminance shall be less than 5 % of the stabilized value per hour and less than 1 % of the stabilized value per minute. Care shall be taken that the temperature of the DUT has stabilized and is not affected by the backlight illumination system. Constant and correct temperature of the DUT should be verified.

If no built-in lightsource is used, the backlight luminance or backlight illuminance of the arrangement used for illumination of the DUT shall be constant within $\pm 1\%$, and shall not exhibit short-term fluctuations (e.g. ripple, PWM, etc.). This should be realized by an equilibration period of 5 min to 10 min. Constant and correct temperature of the DUT should be verified.

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. During the measurement the light-measuring device is replacing the observer, looking from the same direction at a specified spot (i.e. measuring spot, measurement field)