



**NSAI**  
Standards

Irish Standard  
I.S. EN 61747-30-1:2012

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

## I.S. EN 61747-30-1:2012

*Incorporating amendments/corrigenda issued since publication:*

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard – national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation - recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

<i>This document replaces:</i> EN 61747-6:2004	<i>This document is based on:</i> EN 61747-30-1:2012 EN 61747-6:2004	<i>Published:</i> 24 August, 2012 25 May, 2004
This document was published under the authority of the NSAI and comes into effect on:  11 September, 2012		ICS number: 31.120
<b>NSAI</b> 1 Swift Square, Northwood, Santry Dublin 9	T +353 1 807 3800 F +353 1 807 3838 E standards@nsai.ie  W NSAI.ie	<b>Sales:</b> T +353 1 857 6730 F +353 1 857 6729 W standards.ie
Údarás um Chaighdeáin Náisiúnta na hÉireann		

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 61747-30-1**

August 2012

ICS 31.120

Supersedes EN 61747-6:2004

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)

This European Standard was approved by CENELEC on 2012-07-30. 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

**Management Centre: Avenue Marnix 17, B - 1000 Brussels**

## **I.S. EN 61747-30-1:2012**

EN 61747-30-1:2012

- 2 -

### **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.

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 61747-30-1:2012 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	-	-
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	-	-

*This page is intentionally left BLANK.*

## CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references .....	8
3 Terms, definitions and abbreviations .....	8
3.1 Terms and definitions .....	8
3.2 Abbreviations .....	9
4 Illumination and illumination geometry .....	9
4.1 General comments and remarks on the measurement of transmissive LCDs .....	9
4.2 Viewing-direction coordinate system.....	9
4.3 Standard illumination geometries.....	10
5 Standard measurement equipment and set-up.....	11
5.1 Light measuring devices (LMD) .....	11
5.2 Positioning and alignment .....	11
5.3 Standard measurement arrangements .....	11
5.3.1 LMD conditions.....	11
5.3.2 Effects of receiver inclination.....	11
5.4 Standard locations of measurement field .....	12
5.4.1 Matrix displays .....	12
5.4.2 Segment displays .....	13
5.5 Standard DUT operating conditions .....	13
5.5.1 General .....	13
5.5.2 Standard ambient conditions .....	13
5.6 Standard measuring process .....	13
6 Standard measurements and evaluations .....	14
6.1 Luminance – photometric .....	14
6.1.1 Purpose.....	14
6.1.2 Measurement equipment .....	14
6.1.3 Measurement method .....	14
6.1.4 Definitions and evaluations.....	15
6.2 Contrast ratio .....	15
6.2.1 Purpose.....	15
6.2.2 Measurement equipment .....	15
6.2.3 Measurement method .....	15
6.2.4 Definitions and evaluations.....	16
6.2.5 Specified conditions .....	16
6.3 Chromaticity and reproduction of colour .....	17
6.3.1 Purpose.....	17
6.3.2 Measurement equipment .....	17
6.3.3 Measurement method: photoelectric tristimulus colorimetry .....	17
6.3.4 Measurement method spectrophotometric colorimetry .....	17
6.3.5 Definitions and evaluations.....	17
6.3.6 Specified conditions .....	19
6.4 Viewing angle range.....	19
6.4.1 Purpose.....	19

6.4.2	Measurement equipment .....	19
6.4.3	Contrast and luminance based viewing angle range.....	19
6.4.4	Viewing angle range without grey-level inversion.....	20
6.4.5	Chromaticity based viewing angle range.....	21
6.4.6	Visual quality-based viewing angle range .....	21
6.5	Electro-optical transfer function – photometric.....	22
6.5.1	Purpose.....	22
6.5.2	Measurement equipment .....	22
6.5.3	Measurement method .....	22
6.5.4	Evaluation and representation .....	22
6.6	Electro-optical transfer function – colorimetric .....	23
6.6.1	Purpose.....	23
6.6.2	Set-up .....	23
6.6.3	Measurement method .....	23
6.6.4	Definitions and evaluations.....	23
6.7	Lateral variations (photometric, colorimetric) .....	24
6.7.1	Purpose.....	24
6.7.2	Measurement equipment .....	24
6.7.3	Uniformity of luminance .....	24
6.7.4	Uniformity of white.....	25
6.7.5	Uniformity of chromaticity .....	25
6.7.6	Uniformity of primary colours .....	25
6.7.7	Cross-talk.....	26
6.7.8	Mura.....	28
6.7.9	Image sticking .....	28
6.7.10	Specified conditions .....	28
6.8	Reflectance from the active area surface.....	28
6.8.1	Purpose.....	28
6.8.2	Measurement equipment .....	29
6.8.3	Measurement method .....	29
6.8.4	Definitions and evaluation .....	30
6.8.5	Specified conditions .....	30
6.9	Spectral transmittance factor.....	30
6.9.1	Purpose.....	30
6.9.2	Measurement equipment .....	31
6.9.3	Definitions and evaluation .....	31
6.10	Temporal variations.....	32
6.10.1	Response time .....	32
6.10.2	Flicker / frame response (multiplexed displays) .....	34
6.10.3	Critical flicker frequency .....	36
6.10.4	Specified conditions .....	36
6.11	Electrical characteristics.....	37
6.11.1	Purpose.....	37
6.11.2	Measurement equipment .....	37
6.11.3	Measurement method .....	37
6.11.4	Definitions and evaluations.....	38
6.11.5	Specified conditions .....	38
6.12	Warm-up characteristics .....	39
6.12.1	Purpose.....	39



6.12.2 Measurement equipment .....	39
6.12.3 Measurement method .....	39
6.12.4 Specified conditions .....	40
Annex A (informative) Standard measuring conditions .....	41
Annex B (informative) Devices for thermostatic control .....	44
Annex C (informative) Measuring the electro-optical transfer function .....	45
Annex D (informative) Planned future structure .....	46
Bibliography .....	47

Figure 1 – Representation of the viewing-direction (equivalent to the direction of measurement) by the angle of inclination, $\theta$ and the angle of rotation (azimuth angle), $\phi$ in a polar coordinate system .....	10
Figure 2 – Shape of measuring spot on DUT for two angles of LMD inclination .....	12
Figure 3 – Standard measurement positions are at the centres of all rectangles $p_0$ - $p_{24}$ .....	12
Figure 4 – Example of gray-scale inversion .....	21
Figure 5 – Example of standard set-up for specular reflection measurements .....	29
Figure 6 – Example of equipment for measurement of temporal variations .....	32
Figure 7 – Relationship between driving signal and optical response times .....	34
Figure 8 – Frequency characteristics of the integrator (response of human visual system) .....	35
Figure 9 – Example of power spectrum .....	36
Figure 10 – Checker-flag pattern for current and power consumption measurements .....	37
Figure 11 – Example of measuring block diagram for current and power consumption of a liquid crystal display device .....	39
Figure 12 – Example of warm-up characteristic .....	40
Figure A.1 – Terminology for LMDs .....	42

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

---

### **LIQUID CRYSTAL DISPLAY DEVICES –**

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

#### **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 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.

**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.**

## 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.

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

- 
- Looking for additional Standards? Visit Intertek Inform Infostore
  - Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation
-