IEC 63181-2

Edition 1.0 2020-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE

LCD multi-screen display terminals –
Part 2: Measuring methods

Terminaux d'affichage à plusieurs écrans LCD –
Partie 2: Méthodes de mesure

IEC 63181-2:2020-06(en-fr)

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,…). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary
67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

A propos de l'IEC
La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC
Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC - webstore.iec.ch/advsearchform
La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,…). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished
Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc
Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

Electropedia - www.electropedia.org
Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 000 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary
67 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

IEC 63181-2

Edition 1.0 2020-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE

LCD multi-screen display terminals –
Part 2: Measuring methods

Terminaux d'affichage à plusieurs écrans LCD –
Partie 2: Méthodes de mesure

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 31.120

ISBN 978-2-8322-8444-5

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

LCD MULTI-SCREEN DISPLAY TERMINALS –

Part 2: Measuring methods

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 63181-2 has been prepared by IEC technical committee 100: Audio, video and multimedia systems and equipment.

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

FDIS	Report on voting
100/3413/FDIS	100/3441/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 parts in the IEC 63181 series, published under the general title *LCD multi-screen display terminals*, 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.

LCD MULTI-SCREEN DISPLAY TERMINALS –

Part 2: Measuring methods

1 Scope

This part of IEC 63181 specifies measuring methods for LCD multi-screen display terminals. To evaluate the characteristics of LCD multi-screen display terminals, the following measurement items are specified:

– gap (physical, optical): detailed splicing precision;
– splicing deviation: splicing accuracy of active areas of LCD splicing screen;
– installation deviation: the flatness of terminal surfaces in vertical and horizontal directions;
– luminance uniformity: luminance uniformity of adjacent LCD units;
– chromatic uniformity: chromatic uniformity of adjacent LCD units.

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 TS 63181-1, *LCD multi-screen display terminals – Part 1: Conceptual model*

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in IEC TS 63181-1 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

4 Measuring conditions

4.1 Standard measuring environmental conditions

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

- Temperature: (25 ± 3) °C;
- Relative humidity: 25 % RH to 85 % RH;
- Atmospheric pressure: 86 kPa to 106 kPa;
- Illuminance range: ≤ 1 lx.

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

4.2 Optical measuring distance

Two measurement distance options are provided to perform the measurement:

– Option 1 (recommended): non-contact measurement

  In this option, the measurement distance shall be set to 3 times the height of a single LCD unit; the measurement device shall be perpendicular to the test point(s) during the entire measurement.

– Option 2: contact measurement

  In this option, there is no measurement distance between the LCD units and the measurement device, which means that the measurement device is in direct contact with the surface of the LCD units at the test point(s) during the entire measurement.

5 Measurement methods of structure test for LCD multi-screen display terminals

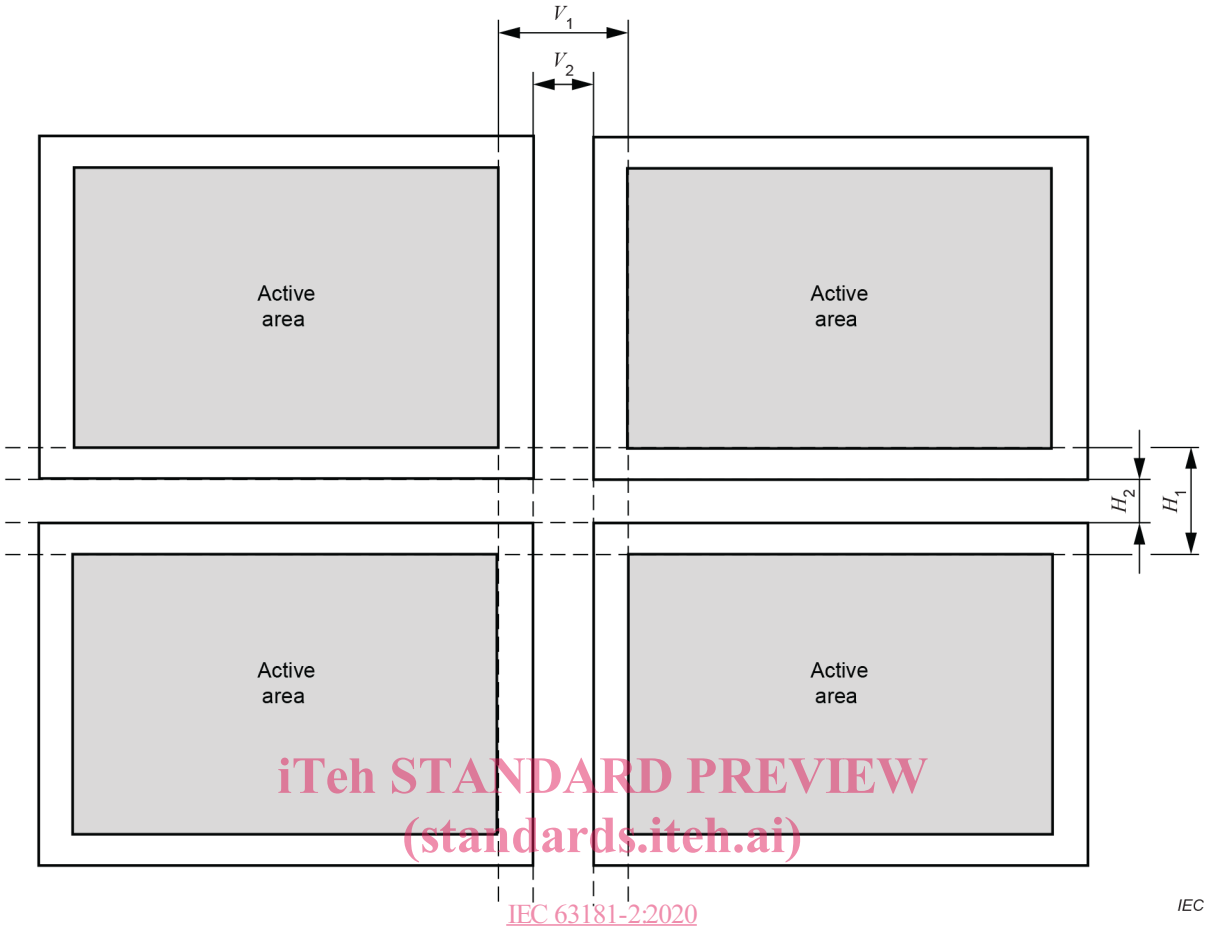
5.1 Physical gap

5.1.1 General

The purpose of this test is to measure the gap(s) between adjacent screen sides for all the adjacent LCD units.

5.1.2 Method of measurement

Apply a feeler gauge(s) to measure the gap(s) between the adjacent screen sides for all the adjacent LCD units. The physical gap is the largest measurement recorded (see Figure 1).



Key

V_1, H_1 the optical gap

V_2, H_2 the physical gap

NOTE This figure shows a 2-by-2 LCD unit matrix as an example only. The relevant requirements are compatible for an m-by-n LCD unit matrix, with $m + n > 2$.

Figure 1 – Illustration for physical gap and optical gap

5.2 Optical gap

5.2.1 General

The purpose of this test is to measure the gap(s) between adjacent active area boundaries for all the adjacent LCD units.

5.2.2 Method of measurement

a) Input a full white signal to the LCD multi-screen display terminals, set all LCD units of the LCD splicing screen to standard states that are factory default settings or manufacturer-specified settings.

b) Use a calliper to measure the gap(s) between adjacent active area boundaries for all the adjacent LCD units; record the largest measurement as the optical gap (see Figure 1).

5.3 Splicing deviation

5.3.1 General

The purpose of this test is to measure the displacement of active areas (in pixels) of an LCD splicing screen.

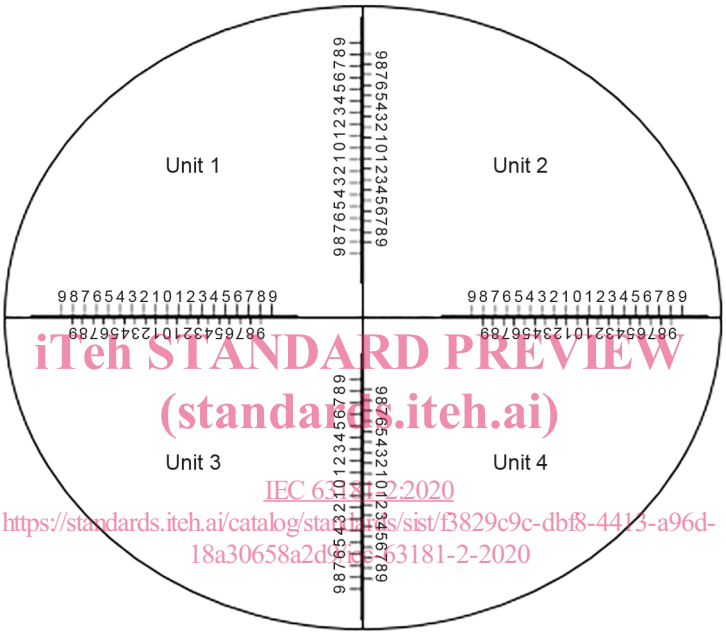
5.3.2 Method of measurement

a) Set all LCD units in the LCD splicing screen to standard states that are factory default settings or manufacturer-specified settings.

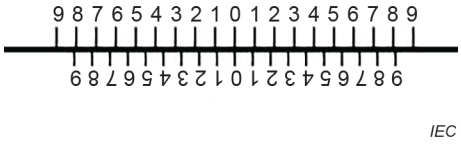
b) Input a signal which is composed of a graduation and a circle. Then, let the signal roam over each group of the 2-by-2 (1-by-2 or 2-by-1 are acceptable when 2-by-2 is not possible) LCD units in the LCD splicing screen, without any overlaps for any adjacent groups.

c) Preliminarily, measure the effect of the circle signal over the whole group (see Figure 2 a)).

d) Accurately measure the displacement of the adjacent active area boundaries in the vertical and horizontal directions of the LCD units with the partial graduation signal (see Figure 2 b).



a) Test signal



b) Partial test signal

Figure 2 – Illustration for test signal

5.4 LCD multi-screen display terminals installation deviation

5.4.1 General

The purpose of this test is to verify the flatness and installation deviation of LCD multi-screen display terminals, including diagonal deviation, edge flatness, LCD splicing screen display surface flatness, vertical installation deviation.

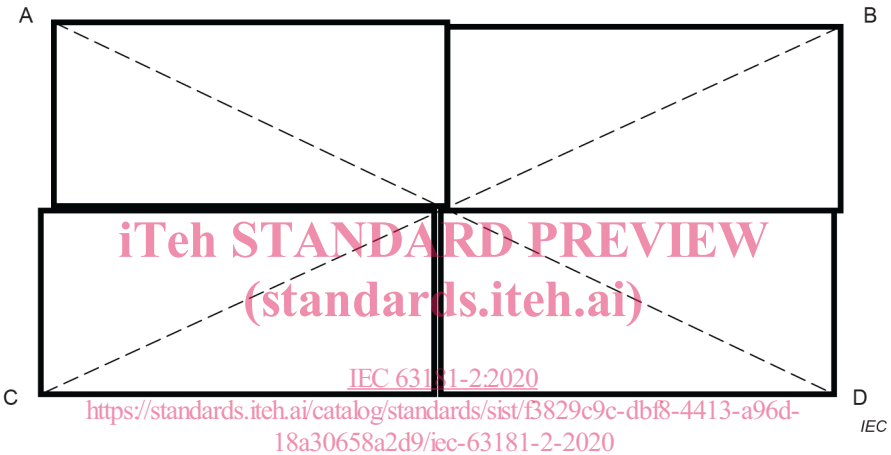
5.4.2 Method of measurement

a) Define the four corners of the LCD splicing screen as A, B, C, D (see Figure 3).

b) Measure the edge lengths of AB, BD, CD, AC, compare the lengths of AB and CD with the width of the LCD splicing screen without installation deviation, record the differences as $\Delta L_{\text{width},1}$ and $\Delta L_{\text{width},2}$; compare AC and BD with the accurate height of the LCD splicing screen without installation deviation, record the differences as $\Delta L_{\text{height},1}$ and $\Delta L_{\text{height},2}$. The differences correspond to the flatness of the edges.

c) Measure and record the length of AD and BC. Then, measure the LCD splicing screen display surface flatness by calculating the length differences of AD and BC as $\Delta L = L_{\text{AD}} - L_{\text{BC}}$ in part b), with the assumption that all the outer edges of LCD splicing screen are aligned. If $\Delta L \neq 0$, it means that the surface of the LCD splicing screen is not flat.

d) Hang a vertical plumb from point B, measure and calculate $\angle$EBD in degrees, which is the LCD splicing screen's vertical installation deviation (see Figure 4).

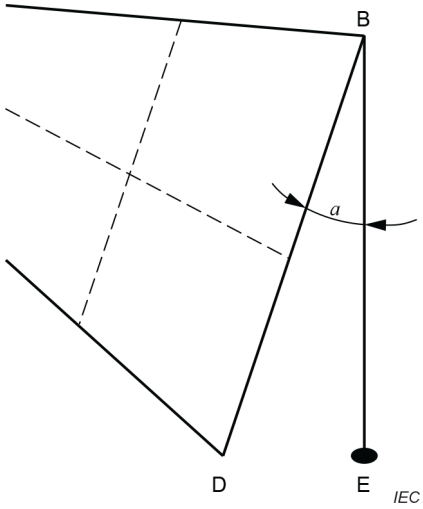


NOTE 1 A, B, C, D are the four vertexes of the LCD splicing screen.

NOTE 2 The ideal gap between LCD units at any installation for calculation is 0.

NOTE 3 This figure shows a 2-by-2 LCD unit matrix as an example only. The relevant requirements are compatible for an m-by-n LCD unit matrix, with $m + n > 2$.

Figure 3 – Illustration for diagonal distances



Key

a ∠EBD, the angle between BE and BD

NOTE This figure shows a 2-by-2 LCD unit matrix as an example only. The relevant requirements are compatible for an m-by-n LCD unit matrix, with $m + n > 2$.

Figure 4 – Illustration for ∠EBD

6 Measuring methods of LCD multi-screen display terminals' optical-electrical performance

6.1 Measuring methods of LCD multi-screen display terminals' luminance – uniformity

6.1.1 LCD splicing screen luminance uniformity

6.1.1.1 General

The purpose of this test is to verify the luminance uniformity of the LCD splicing screen through each LCD unit in the LCD splicing screen. This test procedure is modified from IEC 61747-30-1:2012, 6.7.3.2.

6.1.1.2 Method of measurement

a) Input a full white signal to LCD splicing screen, set all LCD units of LCD splicing screen to standard states that are factory default settings or manufacturer-specified settings.

b) Use a light measurement device (LMD) to measure the centre point luminance for all LCD units and record as L_i with $i = 1,2,3,...$ (see Figure 5).

c) Calculate the average luminance of the LCD splicing screen (see Formula (2));

d) Calculate the luminance uniformity U_{lum} of LCD splicing screen (see Formula (1) with result expressed as a percentage).

$$U_{\text{lum}} = \text{Max}\left(\frac{L_{i=1,2,3...}}{L_{\text{ave}}}\right) \tag{1}$$

$$L_{\text{ave}} = \frac{1}{n}\sum_{i=1,2,3,...}^{n} L_i \tag{2}$$

where

L_{ave} is the LCD multi-screen display terminals' average luminance;

n is the total number of LCD units.