

INTERNATIONAL STANDARD



**Touch and interactive displays –
Part 22-10: Measuring methods of fingerprint recognition performance – Under-
display optical imaging fingerprint sensing**



THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2024 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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 It also gives information on projects, replaced and withdrawn publications.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.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.



IEC 62908-22-10

Edition 1.0 2024-11

INTERNATIONAL STANDARD



**Touch and interactive displays –
Part 22-10: Measuring methods of fingerprint recognition performance – Under-
display optical imaging fingerprint sensing**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 31.120

ISBN 978-2-8327-0031-0

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 Measuring conditions.....	7
4.1 Standard measuring environmental conditions	7
4.2 Starting conditions of measurements	8
5 Measuring system	8
5.1 Under-display optical fingerprint recognition system.....	8
5.2 Standard equipment and setup	8
6 Measurement method of fingerprint recognition performance	9
6.1 Fingerprint recognition system resolution	9
6.1.1 Purpose.....	9
6.1.2 Measuring conditions.....	9
6.1.3 Measurement method	10
6.1.4 Reporting.....	11
6.2 SNR.....	11
6.2.1 Purpose.....	11
6.2.2 Measurement method	11
6.2.3 Reporting.....	12
6.3 FAR and FRR	12
6.3.1 Purpose.....	12
6.3.2 Measurement method	12
6.3.3 Reporting.....	13
Annex A (normative) Measurement method for optical parameters.....	14
A.1 General.....	14
A.2 Standard lighting conditions	14
A.2.1 Darkroom conditions.....	14
A.2.2 Ambient illumination conditions.....	14
A.2.3 Ambient illumination spectra	14
A.3 Standard setup conditions.....	14
A.3.1 Starting conditions of measurements	14
A.3.2 Conditions of measuring equipment	15
A.4 Luminance	15
A.4.1 Purpose.....	15
A.4.2 Measuring equipment	15
A.4.3 Measurement method	16
A.4.4 Reporting.....	16
A.5 Extinction ratio.....	16
A.5.1 Purpose.....	16
A.5.2 Measuring equipment	16
A.5.3 Measurement method	16
A.5.4 Reporting.....	17
A.6 Light leakage ratio	17

- A.6.1 Purpose 17
- A.6.2 Measuring equipment 17
- A.6.3 Measurement method 18
- A.6.4 Reporting..... 18
- A.7 Luminous transmittance 18
 - A.7.1 Purpose 18
 - A.7.2 Measuring equipment 19
 - A.7.3 Measurement method 19
 - A.7.4 Reporting..... 19
- Bibliography..... 20

- Figure 1 – Structure diagram of under-display optical imaging fingerprint recognition system 8
- Figure 2 – Flow chart of measuring system 9
- Figure 3 – Concept of performance measurement 9
- Figure 4 – Example of test target 10
- Figure 5 – Test pattern for resolution measurement 11
- Figure 6 – Example of $n \times n$ pixels block in the valley and ridge region [1] 12
- Figure A.1 – Layout diagram of measurement setup 15
- Figure A.2 – Measuring configuration for extinction ratio measurement..... 17
- Figure A.3 – Measuring configuration for light leakage ratio measurement..... 18
- Figure A.4 – Measurement configuration with light source..... 19

INTERNATIONAL ELECTROTECHNICAL COMMISSION

TOUCH AND INTERACTIVE DISPLAYS –

Part 22-10: Measurement methods of fingerprint recognition performance – Under-display optical imaging fingerprint sensing

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) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 62908-22-10 has been prepared by IEC technical committee 110: Electronic displays. It is an International Standard.

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

Draft	Report on voting
110/1692/FDIS	110/1713/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 62908 series, published under the general title *Touch and interactive 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 webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

IMPORTANT – The "colour inside" logo on the cover page of this document 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.

TOUCH AND INTERACTIVE DISPLAYS –

Part 22-10: Measurement methods of fingerprint recognition performance – Under-display optical imaging fingerprint sensing

1 Scope

This part of IEC 62908 specifies the standard measuring conditions and measurement methods for determining the performance of fingerprint recognition systems with under-display optical imaging fingerprint sensing. This document is applicable to use displays as illumination sources of optical imaging fingerprint sensing.

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 61747-30-5, *Liquid crystal display devices – Part 30-5: Optical measuring methods of transmissive transparent LCD modules*

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

IEC 62341-6-4, *Organic light emitting diode (OLED) displays – Part 6-4: Measuring methods of transparent properties*

3 Terms, definitions, and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1.1

optical imaging fingerprint recognition

<under-display optical imaging fingerprint sensing> recognition method of fingerprint by optical image sensor located beneath the display

3.1.2

fingerprint recognition system resolution

<under-display optical imaging fingerprint sensing> degree of resolution of a fingerprint image acquired by an under-display optical fingerprint recognition system, which is calculated using the contrast transfer function (CTF)