BS IEC 63145-10:2023

BSI Standards Publication

Eyewear display

Part 10: Specifications

Documents
Document Sharing Hub

Full document details: BS IEC 63145-10:2023

National foreword

This British Standard is the UK implementation of IEC 63145-10:2023.

The UK participation in its preparation was entrusted to Technical Committee EPL/47, Semiconductors.

A list of organizations represented on this committee can be obtained on request to its committee manager.

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

© The British Standards Institution 2023
Published by BSI Standards Limited 2023

ISBN 978 0 539 02927 7

ICS 01.040.31; 31.120

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 September 2023.

Amendments/corrigenda issued since publication

Date	Text affected

Documents
Document Sharing Hub

Full document details: BS IEC 63145-10:2023

IEC 63145-10

Edition 1.0 2023-09

INTERNATIONAL STANDARD

Eyewear display –
Part 10: Specifications

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 31.120

ISBN 978-2-8322-7465-1

Warning! Make sure that you obtained this publication from an authorized distributor.

® Registered trademark of the International Electrotechnical Commission

Documents
Document Sharing Hub

Full document details: BS IEC 63145-10:2023

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 Specification tables 7
4.1 Generic specification tables 7
4.2 Basic specification tables 9
5 Common conditions for basic specifications 11
5.1 General 11
5.2 Spectral directional transmittance 11
5.2.1 Measurement methods 11
5.2.2 Measurement conditions 11
5.2.3 Calculation conditions 11
5.3 Maximum centre luminance (full-screen white) 11
5.3.1 Measurement methods 11
5.3.2 Measurement conditions 11
5.4 Minimum centre luminance (full-screen white) 11
5.4.1 Measurement methods 11
5.4.2 Measurement conditions 12
5.5 Luminance uniformity (full-screen white) 12
5.5.1 Measurement methods 12
5.5.2 Measurement conditions 12
5.5.3 Calculation conditions 12
5.6 Centre contrast ratio 12
5.6.1 Measurement methods 12
5.6.2 Measurement conditions 12
5.6.3 Calculation conditions 13
5.7 Diagonal FOV 13
5.7.1 Measurement methods 13
5.7.2 Measurement conditions 13
5.8 Number of electrically addressable pixels 13
5.9 Eye-box width and height 13
5.9.1 Measurement method 13
5.9.2 Measurement conditions 13
6 Specifications for AR displays 13
6.1 General 13
6.2 Specification tables of transmittance and luminance (AR-type) 14
6.3 Classification and applicable cases 14
6.3.1 Spectral directional transmittance 14
6.3.2 Luminance ratio of virtual image versus background 17
7 Specifications for video see-through eyewear displays 21
7.1 General 21
7.2 Specification table to see the image 21
7.3 Video see-through eyewear display – Luminance ratio 21

AVA Documents
Document Sharing Hub

Annex A (informative) Example of illuminance of a scene 23
A.1 Illuminance of indoor scene 23
A.2 Illuminance of outdoor scene 23
Annex B (informative) Back side stray light 24
Bibliography 25

Figure 1 – Examples of ambient illuminations 18
Figure 2 – Image in video see-through eyewear display 21

Table 1 – Blank detail specification table of optical characteristics (applicable to AR and VR) 7
Table 2 – Blank detail specification table of optical characteristics (applicable to AR) 9
Table 3 – Blank basic specification table (AR-type) 10
Table 4 – Blank basic specification table (VR-type) 10
Table 5 – Specification table of transmittance and luminance (AR-type) 14
Table 6 – Classifications of transmittance 15
Table 7 – Level of transmittance for applicable use cases and illuminance 15
Table 8 – Range of luminance ratio 19
Table 9 – Direction to automatic and manual luminance adjustments 20
Table 10 – Specification table of luminance (for eyewear displays excluding optically see-through displays) 21

Documents
Document Sharing Hub
Full document details: BS IEC 63145-10:2023

INTERNATIONAL ELECTROTECHNICAL COMMISSION

EYEWEAR DISPLAY –

Part 10: Specifications

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.

IEC 63145-10 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:

FDIS	Report on voting
110/1539/FDIS	110/1560/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.

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/standardsdev/publications.

AVA Documents
Document Sharing Hub

A list of all parts in the IEC 63145 series, published under the general title *Eyewear display*, 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.

Documents
Document Sharing Hub

Full document details: BS IEC 63145-10:2023

EYEWEAR DISPLAY –

Part 10: Specifications

1 Scope

This part of IEC 63145 establishes specifications and requirements for eyewear displays. This document is applicable to virtual reality (VR)-type (non-see-through) and augmented reality (AR)-type (see-through) eyewear displays using virtual image optics. The specifications and requirements for prescription lenses are out of the scope of this document.

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 63145-1-2, *Eyewear display – Part 1-2: Generic – Terminology*

IEC 63145-20-10:2019, *Eyewear display – Part 20-10: Fundamental measurement methods – Optical properties*

IEC 63145-20-20:2019, *Eyewear display – Part 20-20: Fundamental measurement methods – Image quality*

IEC 63145-22-10:2020, *Eyewear display – Part 22-10: Specific measurement methods for AR type – Optical properties*

IEC 63145-22-20[1], *Eyewear display – Part 22-20: Specific measurement methods for AR type – Image quality*

3 Terms, definitions, and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 63145-1-2 and the following apply.

ISO and IEC maintain terminological 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

[1] Under preparation. Stage at the time of publication: IEC AFDIS 63145-22-20:2023.

Documents
Document Sharing Hub

Full document details: BS IEC 63145-10:2023

3.1.1
number of electrically addressable pixels
total number of physical pixels which are electrically accessible and constitute the micro display that is used to display the image

Note 1 to entry: It is described by $H \times V$, where H and V are the numbers of horizontal and vertical pixels, respectively.

Note 2 to entry: This term does not consider the kind of sub-pixel arrangement.

3.2 Abbreviated terms

AR augmented reality

DUT device under test

FOV field of view

LCD liquid crystal display

LMD light measuring device

VR virtual reality

4 Specification tables

4.1 Generic specification tables

Table 1 and Table 2 shall be applied as the generic specification tables of optical characteristics of eyewear displays. These tables show the list of items which specifies the optical characteristics of eyewear displays.

Table 1 – Blank detail specification table of optical characteristics (applicable to AR and VR)

Characteristics	Symbol	Unit	VR		AR		Measurement methods
			Min.	Max.	Min.	Max.	
Monocular characteristics							
Maximum centre luminance	L_{vCM}	cd/m^2	-		-		IEC 63145-20-10:2019, 6.3
Minimum centre luminance	L_{vCm}	cd/m^2		-		-	IEC 63145-20-10:2019, 6.3
Nine-point luminance	L_{vi} (i = 0 to 8)	cd/m^2					IEC 63145-20-10:2019, 6.3
Average luminance	L_{va}	cd/m^2					IEC 63145-20-10:2019, 6.3
Luminance uniformity	U	%					IEC 63145-20-10:2019, 6.3
Luminance non-uniformity	NU	%					IEC 63145-20-10:2019, 6.3
Chromaticity of white at the centre	(x_W, y_W), (u'_W, v'_W)						IEC 63145-20-10:2019, 6.4
Chromaticity of red at the centre	(x_R, y_R), (u_R', v'_R)						IEC 63145-20-10:2019, 6.4
Chromaticity of green at the centre	(x_G, y_G), (u'_G, v'_G)						IEC 63145-20-10:2019, 6.4
Chromaticity of blue at the centre	(x_B, y_B), (u'_B, v'_B)						IEC 63145-20-10:2019, 6.4

AVA Documents Document Sharing Hub

Full document details: BS IEC 63145-10:2023