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Electronic displays –
Part 2-2: Measurements of optical characteristics – Ambient performance

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FOREWORD

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International Standard IEC 62977-2-2 has been prepared by IEC technical committee 110: Electronic displays.

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

FDIS	Report on voting
110/1213/FDIS	110/1232/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 62977 series, published under the general title *Electronic displays*, 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.

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- withdrawn,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.

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INTRODUCTION

This document describes the common optical measurement methods applicable in the field of electronic display devices, which overlap with some of the parts of existing documents developed inside TC 110 (IEC 61747-6-2 [17][1], IEC 62341-6-2 [18], IEC 61988-2-2 [19], IEC 62715-5-1 [20], IEC 62679-3-1 [21]), that describe the optical measurement methods of the individual technologies, such as LCD, OLED, PDP and others. This document on common optical measurement methods is intended to be used as the reference document in future documents and in revisions of existing documents (e.g. IEC 61747-6-2 [17], IEC 62341-6-2 [18], IEC 61988-2-2 [19], IEC 62715-5-1 [20], IEC 62679-3-1 [21]). The existing standards documents will be revised in their maintenance time and they will refer to this document to the largest extent.

All documents in IEC TC 110 that are concerned with the measurement of optical properties of electronic display devices under ambient illumination refer to a set of methods and procedures that are similar to each other, or sometimes even identical. This document is intended to identify these methods and to describe them, together with suitable precautions and diagnostics, as a reference for forthcoming documents to make the work of the involved experts more efficient and to avoid duplication of efforts.

Introduction of the common optical measurement methods (COMMs) is also related to a structure where each kind of optical measurement finds its unambiguous position for identification of similarities to other methods or for clarification of distinctions. This structural classification together with a general taxonomy is supposed to make the process of documents production easier, faster and thus more effective.

The above characteristics are summarized in Table 1. The display characteristics that are addressed in this part of IEC 62977 are indicated by a check mark √ in the table.

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1 Numbers in square brackets refer to the Bibliography.

Table 1 – Measurement structure from optical quantities to evaluation and to results (top down)

Variables	**Time**		**Location** (x, y)	**Direction** (θ, ϕ)	**Test pattern, electrical driving, input signal**	**Illumination conditions**	**Temperature, humidity**
Data sampling condition	**Fast**	**Slow**	**Slow**	**Slow**	**Slow** √		
Evaluation							
Results	Transitions from one optical state to another state (for example from test-pattern-1 to test-pattern-2)	Temporal stability (uniformity)	Lateral uniformity	Directional uniformity	Static pattern, √ Characteristic function (electro-optic transfer function, EOTF) Characteristic values (e.g. threshold, saturation)	Darkroom, √ Indoor, Outdoor	Standard environment √
Evaluation 1st order	Turn-on, turn-off, delay (latency) time periods, temporal modulations				Luminance, √ Contrast, √ chromaticity, √ Threshold, saturation values, steepness of transitions, etc.		
Evaluation 2nd order	Flicker prediction, moving picture response time, etc.				EOTF from which the exponent γ is evaluated Chromaticity/ colour gamut area, Colour gamut volume, √		

ELECTRONIC DISPLAYS –

Part 2-2: Measurements of optical characteristics – Ambient performance

1 Scope

This part of IEC 62977 specifies standard measurement conditions and measuring methods for determining the optical characteristics of electronic displays under indoor and outdoor illumination conditions. Standard illumination geometries are specified and the reflection properties of flat screens are determined under those conditions. Reference illumination levels and spectra are used to estimate the photometric and colorimetric characteristics of electronic displays under the same conditions. These methods apply to emissive, transmissive, and reflective displays, or combinations thereof, that render real 2D images on a flat screen.

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 60050-845, *International Electrotechnical Vocabulary (IEV) – Part 845: Lighting*

IEC 61966-2-1, *Multimedia systems and equipment – Colour measurement and management – Part 2-1: Colour management – Default RGB colour space – sRGB*

ISO/CIE 11664-1, *Colorimetry – Part 1: CIE standard colorimetric observers*

ISO/CIE 11664-4, *Colorimetry – Part 4: CIE 1976 L*a*b* colour space*

ISO 15076-1:2010, *Image technology colour management – Architecture, profile format and data structure – Part 1: Based on ICC.1:2010*

CIE 15, *Colorimetry*

CIE 168, *Criteria for the evaluation of extended-gamut colour encoding*