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Laser displays -
Part 5-8: Measurement of scanning characteristics for raster-scanning laser display

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

Draft	Report on voting
110/1872/FDIS	110/1893/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 62906 series, published under the general title *Laser 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– withdrawn, or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.

INTRODUCTION

A micro-electromechanical system (MEMS) scanner used in raster-scanning laser displays is expected to accurately control the deflection of the laser beam in order to exactly reproduce an image on a projection screen. The scanning characteristics described in this document are affected not only by the accuracy of the beam deflection itself, but also by the precision of the timing control of each image signal in synchronization with the beam trajectories. In practice, deviations are often observed between the projected line patterns on the screen and intended patterns defined by the input image signals [1][1],[2]. Such deviations can result from factors including the inertia of the MEMS scanner, the stability of the laser source, and the performance of the associated driver software.

Nevertheless, the projected images can be calibrated by their driver software. Therefore, the measurement of scanning characteristics is essential not only for optimal design of control systems of the MEMS scanner and the laser sources, but also for effective development of the image calibration software.

The scanning characteristics in this document include scanning linearity, scanning repeatability, and waviness, as specified in 3.1. Some measurement methods were referenced from Information Display Measurements Standard (IDMS) [3].

[1] Numbers in square brackets refer to the Bibliography.

1 Scope

This part of IEC 62906 specifies the standard measurement conditions and methods of scanning characteristics for raster-scanning laser display which uses a MEMS mirror as optical scanner and is designed for projection onto 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 62906-1-2, *Laser display devices - Part 1-2: Vocabulary and letter symbols*

3 Terms, definitions, abbreviated terms and letter symbols

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62906-1-2 and the following apply.

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

– IEC Electropedia: available at https://www.electropedia.org/

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3.1.1
scanning linearity
<laser displays> maximum of the measured absolute values of the deviation between the displayed vertical (or horizontal) line position (centre of the linewidth) and the target line position (centre of the linewidth), normalised by the width (or height) of the raster-scanning area projected on a virtual screen, expressed as a percentage

3.1.2
scanning repeatability
<laser displays> ratio of successively scanned multi-frame vertical (or horizontal) line width to single-frame vertical (or horizontal) line width at the same position in the raster-scanning area projected on a virtual screen, expressed as a percentage

3.1.3
waviness
<laser displays> subtraction of the maximum and the minimum values of the deviation in the horizontal (or vertical) direction of the measured points along the vertical (or horizontal) line from the linear regression line calculated using the measured coordinates, which is normalized by the width (or height) of the raster-scanning area projected on a virtual screen and expressed as a percentage

EXAMPLE An example of the measured waviness data for a vertical line is provided in Annex A.

Note 1 to entry: The measured deviations are observed on both positive and negative sides of the regression line which was predetermined by regression analysis using the measured data. In most cases (such as the example in Annex A), the measured displacement data show peak-to-valley waving characteristics.