

SEMI D61-1110

TEST METHOD OF PERCEPTUAL ANGLE FOR OLED DISPLAYS

This Standard was technically approved by the Flat Panel Display – Metrology Global Technical Committee.
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1 Purpose

1.1 This Standard describes a method for measuring angle dependent quality for Organic Light Emitting Diode (OLED) displays.

2 Scope

2.1 This Standard is applicable to the standard quality evaluation of OLED displays. The standard includes the measuring, analyzing, and calculating methods of perceptual angle.

NOTICE: SEMI Standards and Safety Guidelines do not purport to address all safety issues associated with their use. It is the responsibility of the users of the Documents to establish appropriate safety and health practices, and determine the applicability of regulatory or other limitations prior to use.

3 Referenced Standards and Documents

3.1 IEC® Standards¹

IEC 62341-6-2 — Organic Light Emitting Diode (OLED) Displays – Part 6-2: Measuring Methods of Visual Quality and Ambient Performance

3.2 VESA® Standards²

VESA-2001-6 — Flat Panel Display Measurement

NOTICE: Unless otherwise indicated, all documents cited shall be the latest published versions.

4 Terminology

4.1 Definitions

4.1.1 *colour appearance model* — a colour appearance model provides perceptual attribute correlates by predicting changes of colour appearance of a visual stimulus under various different viewing conditions.

4.1.2 *colour volume* — the volume of a colour space in the three-dimensional concept of how much space it occupies correlated with a set of colours.

4.1.3 *perceptual angle* — the angle at which the colour volume drops to specific level comparing to that of on-axis. The colour volume could represent colour quality that human perceives.

4.1.4 *primary colour* — a set of colours that can be combined to produce any desired set of intermediate colours, within a limitation called the “gamut.”

4.1.4.1 The primary colours for colour television are red, green, and blue.

4.1.4.2 The exact red, green, blue colours used are dependent on the television standard.

4.1.4.3 Display devices do not usually use the same primary colours, resulting in minor colour changes from ideal.

¹ International Electrotechnical Commission, 3 rue de Varembe, Case Postale 131, CH-1211 Geneva 20, Switzerland; Telephone: +41.22.919.02.11, <http://www.iec.ch>. IEC trademark is owned by International Electrotechnical Commission.

² VESA, 3855 SW 153rd Drive, Beaverton, OR 97003, USA; Telephone: +1.503.619.0279, <http://www.vesa.org>. VESA trademark is owned by VESA.

5 Standard Measurement Condition

5.1 Temperature, Humidity, and Pressure

5.1.1 Measurements shall be carried out under the standard environmental conditions (e.g., at a temperature of 25°C $\pm$ 3°C, a relative humidity of 25% to 85%, and a pressure of 86 kPa to 106 kPa).

5.1.2 When different environmental conditions are used, these shall be noted on the report.

5.2 Measurements shall be not carried out under vibration and windy conditions.

5.3 Illuminant Conditions

Table 1 Illuminant Conditions

Dark room condition	≤ 0.01 cd/m ²		
Ambient condition	Indoor	Hemispherical	TV viewing condition: 60 lux Office: 300 lux
		Direct	TV viewing condition: 40 lux Office: 200 lux
	Daylight	Hemispherical	15000 lux
		Direct	65000 lux

5.3.1 Detail conditions follow ¶ 5.2.1 and ¶ 5.2.2 of IEC 62341-6-2.

5.3.2 When different conditions are used, these shall be noted on the report.

5.3.2.1 In order to measure the correct illuminance of the indoor room with the least amount of light reflection from the display, the display shall be moved from the measurement position or be lined with black solid color.

5.3.2.2 The room, including walls, floor, and ceiling, shall be covered in gray or black curtains and rugs.

5.4 Equipment

5.4.1 Display power source.

5.4.2 Display driving equipment and display pattern generator.

5.4.3 Optical performance measurement device.

5.4.3.1 The Measurement device should be calibrated before the measurement is performed.

5.4.4 Two orthogonal axes of rotation that rotates an object to a particular orientation.

6 Standard Measuring Method

6.1 Optical Performance Measurement

6.1.1 Patterns

6.1.1.1 3 types of patterns can be used for measurement.

6.1.1.2 Luminance level of device under test (DUT) may depend on the pattern types due to the loading effect of the OLED display.

6.1.1.3 It shall be noted on the report which patterns are used for measurements.

6.1.1.4 Full Screen Patterns

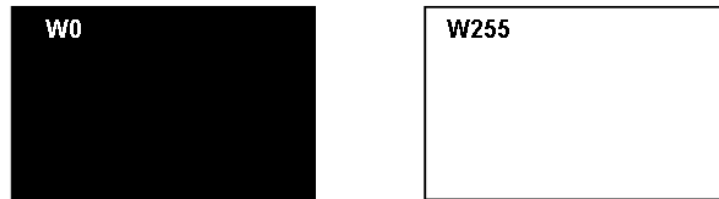


Figure 1
Black and White Full Screen Patterns

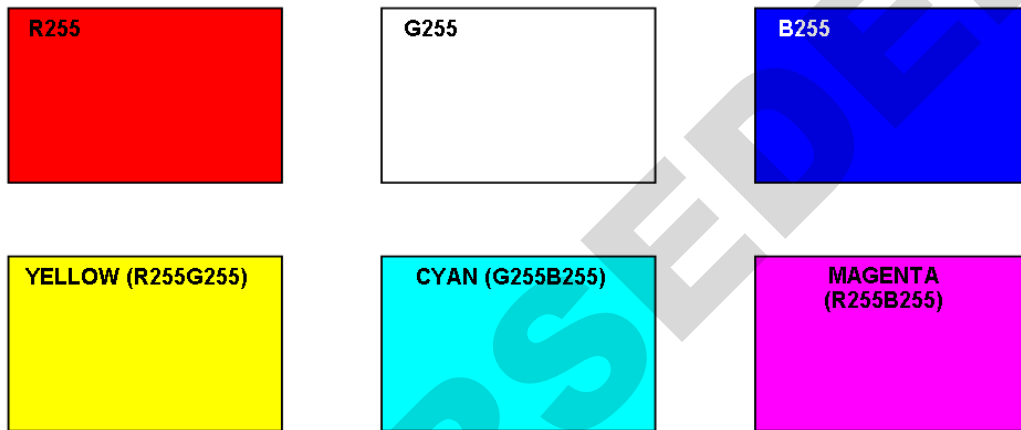


Figure 2
Full Screen Patterns of Colours

6.1.1.5 4% Window Patterns

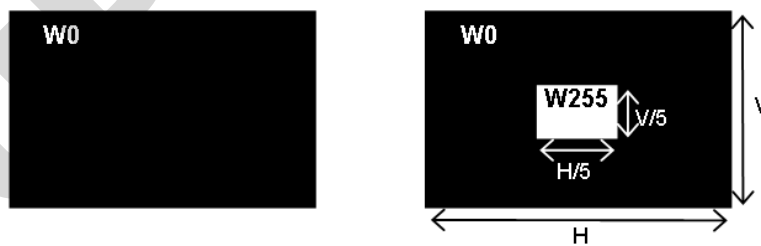


Figure 3
Black and White 4% Window Patterns