

SEMI D34-0710

TEST METHOD FOR FPD POLARIZING FILMS

This Standard was technically approved by the global Flat Panel Display – Materials & Components Committee.
This edition was approved for publication by the global Audits and Reviews Subcommittee on May 21, 2010.
Initially available at www.semi.org in June 2010. Originally published July 2003.

1 Purpose

1.1 This Standard establishes implementation guidelines for the measurement of visual appearance, thickness, and optical characteristics of FPD Polarizing Films. These methods can be applied in manufacturing, quality control, and research and development.

2 Scope

2.1 This Document specifies measurement methods.

2.2 Specifies measurement methods for visual appearance (dot defects, line defects, visual exclusion area), thickness, optical characteristics (single transmittance, parallel transmittance, cross transmittance, UV cut performance, polarization efficiency, hue a, b and hue a*, b* and haze) of polarizing films.

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 ISO Standards¹

ISO 3668 — Paints and varnishes – Visual Comparison of the Colour of Paints

ISO 7724-3 — Paints and varnishes – Colorimetry – Part 3: Calculation of Colour Differences

ISO 11664-1 (CIE S 014-1/E) — Colorimetry – Part 1: CIE Standard Colorimetric Observers

ISO 11664-2 (CIE S 014-2/E) — Colorimetry – Part 2: CIE Standard Illuminants

ISO 11664-4 (CIE S 014-4/E) — Colorimetry – Part 4: CIE 1976 L*a*b* Colour Space

3.2 JIS Standards²

JIS K7105 — Testing Methods for Optical Characteristics of Plastics

JIS Z8701 — Colour Specification – The CIE 1931 Standard Colorimetric System and the CIE 1964 Supplementary Standard Colorimetric System

JIS Z8720 — Standard Illuminants and Sources for Colorimetry

JIS Z8723 — Methods for Visual Comparison of Surface Colours

JIS Z8729 — Colour Specification – CIE LAB and CIE LUV Colour Spaces

JIS Z8730 — Colour Specification – Colour Difference of Object Colours

3.3 Other Documents

CIE 15-3 — CIE Standard Colorimetric Illuminants³

¹ International Organization for Standardization, ISO Central Secretariat, 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland; Telephone: +41.22.749.01.11, Fax: +41.22.733.34.30, <http://www.iso.org>

² Japanese Standards Association, 4-1-24 Akasaka, Minato-ku, Tokyo 107-8440, Japan; Telephone: +81.3.3583.8005, Fax: +81.3.3586.2014, <http://www.jsa.or.jp>

³ Commission Internationale de l'Eclairage, Kegelgasse 27, A-1030 Vienna, Austria; Telephone: +43.1.714.31.87.0, Fax: +43.1.714.31.87.18, <http://www.cie.co.at>

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

4 Terminology

4.1 None.

5 Definitions of Measured Object and Summary of Measurement Methods

5.1 Visual Appearance of Polarizing Film (Dot Defects)

5.1.1 Definition of Defect Size

5.1.1.1 *Non-White Spot* — Points that can be verified visually during reflection inspection and transmission inspection. Size is defined by measuring the long side and short side of the core section and taking their mean value (Φ).

5.1.1.2 *White Spot* — Points that can be verified visually during Cross-Nicol transmission inspection. Size is defined by measuring the long side and short side of the core section and taking their mean value (Φ).

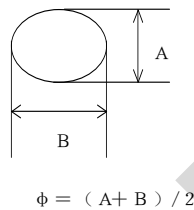


Figure 1
Definition of Defect Size (Dot Defect)

5.1.2 *Defect Measurement (Inspection) Method* — Observe defects under fluorescent light (600 to 1600 lux), using either reflection, transmission, or Cross-Nicol transmission inspection, or a combination of the above, at approximately 30 cm from the sample.

5.1.2.1 Reflection Inspection: Conduct on a blackboard, using fluorescent light.

5.1.2.2 Transmission Inspection: Conduct on a backlight.

5.1.2.3 Cross-Nicol: Place a reference polarizing film on a backlight, and conduct transmission inspection in transmission inspection Cross-Nicol state.

5.2 Polarizing Film Visual Appearance (Line Defects)

5.2.1 Defect Size Definition

5.2.1.1 Line defects visually detected during reflection, transmission, or Cross-Nicol inspection. Size is defined by measuring the length of the long side and short side.

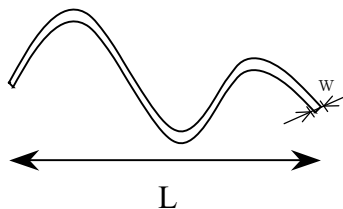


Figure 2
Definition of Defect Size (Line Defect)

5.2.2 Defect Measurement (Inspection) Method — Observe defects under fluorescent light, using either reflection, transmission, or Cross-Nicol transmission inspection, or a combination of the above, at approximately 30 cm from the sample.

5.2.2.1 Reflection Inspection: Conduct on a blackboard, using fluorescent light.

5.2.2.2 Transmission Inspection: Conduct on a backlight.

5.2.2.3 Cross-Nicol: Place a reference polarizing film on a backlight, and conduct transmission inspection in transmission inspection Cross-Nicol state.

5.3 Polarizing Film Visual Appearance (Visual Exclusion Area)

5.3.1 Definition

5.3.1.1 L (Length of the Visual Exclusion Area) is the measurement of the distance from each side of the polarizing film.

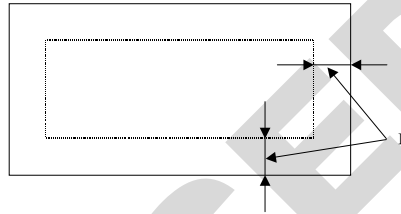


Figure 3
Definition of Visual Exclusion Area

5.4 Polarizing Film Thickness

5.4.1 Thickness Definition

5.4.1.1 Thickness, excluding the thickness of protective film and separate film.

5.4.2 Thickness Measurement Method

5.4.2.1 Measured using a thickness gauge that can measure to 0.001 mm.

5.5 Polarizing Film Optical Characteristics

5.5.1 Definition of Single Transmittance (T_y) and Measurement Method

5.5.1.1 Value of Transmittance of one polarizing film, visibility corrected (ISO 11664-1) by supplementary standard illuminant C (CIE 15-3), 2° range of view. CIE standard illuminant D65 also can be used. In any case, the illuminant used shall be reported.

NOTE 1: Illuminant C is commonly known as “Light Source C” and is abbreviated to “Ill.C”. Illuminant C does not have the status of a CIE standard, but its relative spectral power distribution, tristimulus values, and chromaticity coordinates are given in CIE 15-3, as it is used in many practical measurement instruments and calculations.

5.5.1.2 Measurement Conditions

5.5.1.2.1 Equipment: Spectrophotometer.

5.5.1.2.2 Measurement Wavelength: 400 to 700 nm (10 nm intervals).

5.5.2 Definition and Measurement Method of Parallel Transmittance ($T_{//}$)

5.5.2.1 Value of Transmittance of 2 polarizing films placed parallel Nicol, visibility corrected (ISO 11664-1) by supplementary standard illuminant C (CIE 15-3), 2° range of view.