

SEMI D33-0703

MEASURING METHOD OF OPTICAL CHARACTERISTICS FOR BACKLIGHT UNIT

This Standard was technically approved by the Flat Panel Display Global Technical Committee. This edition was approved for publication by the global Audits and Reviews Subcommittee on April 28, 2003. Available at www.semi.org in July 2003.

NOTICE: This Standard or Safety Guideline has an Inactive Status because the conditions to maintain Current Status have not been met. Inactive Standards or Safety Guidelines are available from SEMI and continue to be valid for use.

1 Purpose

1.1 The electro optical characteristics of backlight unit (BLU) have a great influence on the characteristics of LCD like uniformity, luminance and chromaticity etc. There are many measurement methods for BLU of electro optical characteristics. It is so different that the measurement method for BLU in each company (e.g., the testing position, test condition, equipment concept etc.). Therefore, this Standard will present the general measurement method.

2 Scope

2.1 This Standard is applicable to BLU for liquid crystal display (LCD) and the measurement includes only the optical area. The other areas (electric characteristics, reliability, and so forth) are dealt with by other SEMI Standards.

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 Limitations

3.1 This Standard does not include the test of each BLU component such as: light guide panel, optical film, cold cathode fluorescent lamp (CCFL), film characteristics, and etc.

4 Referenced Standards and Documents

4.1 Other Standards

4.1.1 Flat Panel Display Measurement Standard, VESA FPDM 2.0, June 2001.

4.1.2 Commission Internationale de l'Eclairage (CIE), "Colorimetry of Self-Luminous Displays-A Bibliography." CIE Publication No. 87, 1990.

4.1.3 Commission Internationale de l'Eclairage (CIE), "Colorimetry." CIE Publication No. 15.2, 1986.

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

5 Terminology

5.1 None.

6 The Optical Measurement Method

6.1 The test result of BLU can vary because of the environment and measurement conditions. Therefore, the measurement environment and conditions need to be determined.

6.2 Measurement Setup

6.2.1 Environment conditions:

- Temperature: $25 \pm 2^{\circ}\text{C}$.
- Humidity: $65 \pm 20\%$ RH.
- Illumination of surrounding: dark room below 10 lux.

- Air flow: no wind.

6.2.2 Measurement Conditions

6.2.2.1 The measuring distance is suitable for 500 ± 50 mm at field aperture 1° and the viewing direction of all tests are $90^\circ \pm 1^\circ$. This distance is applied for all measurements in this Standard.

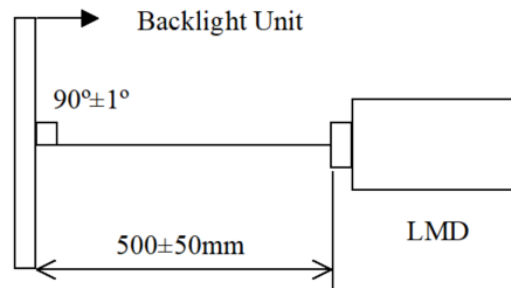


Figure 1
The Measuring Configuration for Measuring Optical Characteristics of BLU

6.2.2.2 Electrical conditions for driving are the typical lamp current and typical operating frequency. A nonconductor for jig of BLU is needed and it must be ground treated to reduce each noise signal.

6.2.3 Measuring Equipment

6.2.3.1 Instrument for Driving of BLU

6.2.3.1.1 In this Standard, a DC power supply is needed and an inverter for BLU driving of electro-optical test. It is required that the DC-power supply has the range of the output voltage between 0 to 30V and has the range of the output current between 0 to 8A.

6.2.3.2 Instrument for Optical Measurement

6.2.3.2.1 In this Standard, spectroradiometer is needed for optical test. Spectroradiometer is more adequate than a filter photometer for BLU color measurement and it can use filter photometer and spectroradiometer for luminance measurement.

6.2.4 Warm-Up Time

6.2.4.1 Warm-up time is the period from power-on to saturation of the light intensity. The optical measurement needs 15 to 30 minutes for a more accurate measurement in case of luminance and luminance uniformity.

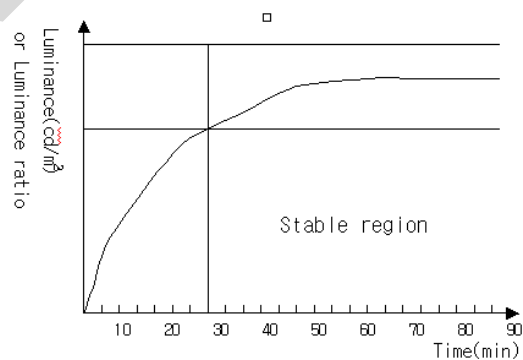


Figure 2
The Warm-Up Time of BLU