Agilent

CCFL Panel's Luminance and White Chromaticity Testing in Manufacturing Environment

Application Note

Agilent Technologies

Abstract
The transition from CRT displays to slimmer, larger, and clear LCD displays has been spurred by advancements in glass-manufacturing technology, and by heightened demand from consumers for larger and clear display screens.

With the trend toward larger LCD displays, addressing defects such as brightness nonuniformity in displays becomes more and more important. Because larger displays lead to an increase in test points, improved test speed and multipoint testing becomes important requirements in backlight-display quality testing. In order to meet the rising expectations of consumers, new display tests need to be developed that enables checking of backlight-display quality using fast multipoint luminance testing.

Introduction

A typical backlight panel luminance test for displays smaller than 30 inches usually involves physical examination by the manufacturer. The test is performed by acquiring data from several points, including the center point of the backlight panel. However, this method usually consumes time and requires a complicated setup. Therefore, it is not feasible for most manufacturers to perform a 100% checkup test on each backlight panel before releasing it to the market.

As an alternative, manufacturers will set aside a number of sample units—"limited samples"—with different types of known defects to be used for comparison. Operators will then use these limited samples to visually inspect and compare the manufactured units to determine if they pass or fail.

Determining the display panel's quality through manual inspection is pretty subjective, as no two individuals have the same judgment. Furthermore, the operators will be prone to making mistakes when fatigue sets in.

For larger backlight unit displays, three to five check points may no longer be adequate due to the increased surface area. It is crucial for the backlight unit and the incorporated light-guide module to be able to dissipate light evenly throughout the entire display panel. Hence, an increase in check points is required for larger backlight unit displays to compensate for the increased surface area. When the check points increase, human visual inspection becomes more and more difficult, and this eventually leads to an increase in human errors.

This application note describes a backlight panel test solution that does not only prevents human errors, but also increases the test speed to achieve a higher manufacturing throughput.

Backlight Panel Test Solution

Agilent's solution to backlight panel testing requires the following items.

- Agilent U2972A-101 Backlight Luminance and White Chromaticity
- Measurement Sensor Measurement Sensor
- Agilent U2972A CCFL Panel Test Platform
- Agilent U2972A CCFL Panel Test Application Software

The block diagram shown in Figure 1 details the test setup.

The light source comes from the lighted display panel, and the input will be captured using the sensor. The input sensed will then be digitized using the panel test platform that is controlled using the application software. The input is then displayed on the application software graphical user interface (GUI).

The parameter under test is light, so we recommend that you perform this test in an environment with no ambient-light interference. Any external light may affect the accuracy of the measurement.

For more information, refer to *Agilent U2972A CCFL Panel Test Solution Data Sheet*, 5989-8462EN.

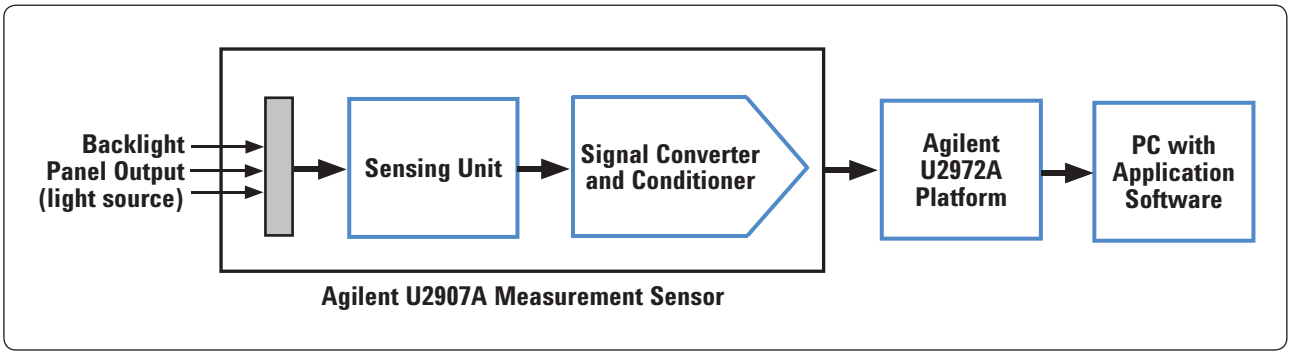

Figure 1. Backlight panel test solution block diagram

Backlight Panel Test Layout

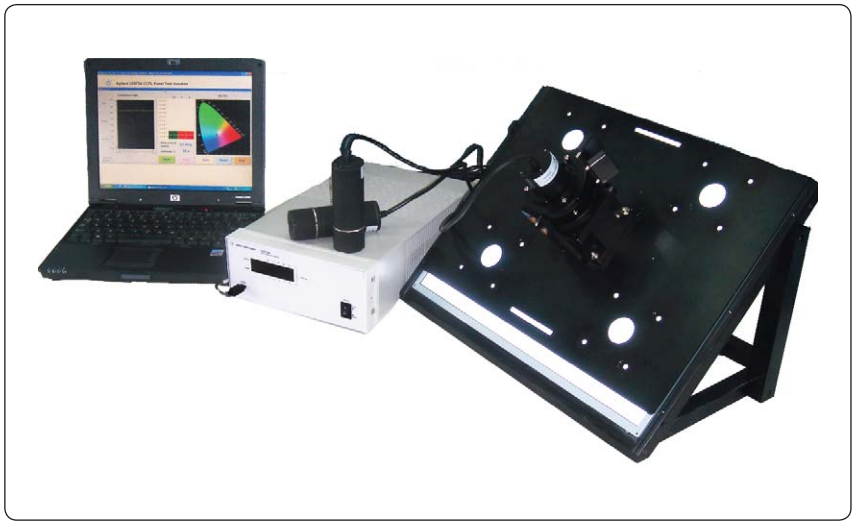

Figure 2. Backlight panel test solution layout

Figure 2 shows the setup of the backlight panel test. The sensor that is connected to the platform is held by a fixture that is placed on top of a display panel. This setup is controlled using the PC that is loaded with the application software.

Data acquisition is performed using the U2972A platform. Its fast sampling rate that enables you to capture and display data within seconds when measurement is made.

Figure 3 shows the application GUI for luminance testing.

In this application, the testing parameters are the luminance and white chromaticity of the test panel. Thus the application software is developed to display the luminance versus wavelength graph, the CIE XY color space coordinates of the test points, and the measured luminance values. This application software also provides a function that allows users to set the maximum and minimum luminance range for each of the active sensors. If the measured value is not within the set range, the reading displayed in the table will change colors accordingly from green (within the set range) to red (out of the set range).

The U2907A is designed to be optically less sensitive to vibration and minute distance changes. Thus, the U2907A is suitable to be used in the manufacturing environment where there are many moving or vibrating parts.

Figure 4 illustrates the setting distance between the sensor module (U2907A) and the light source.

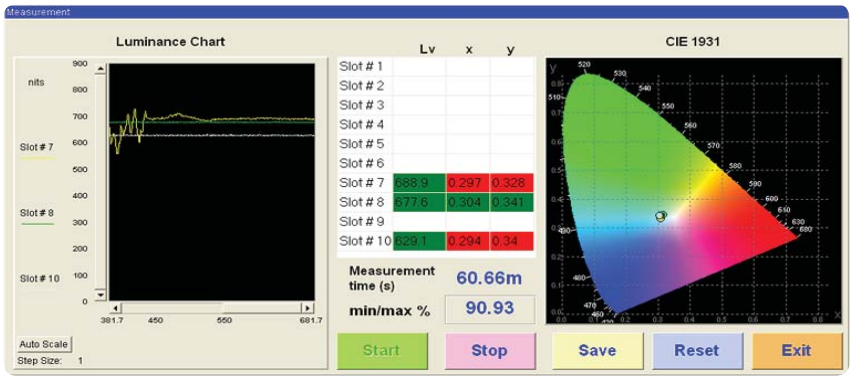

Figure 3. Application software screen shot of luminance testing

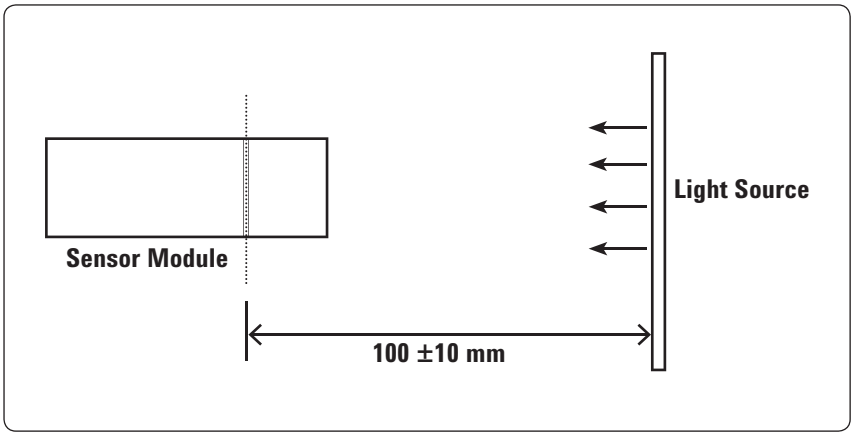

Figure 4. Illustration diagram of the sensing distance, 100 ±10 mm

Conclusion

The Agilent U2972A CCFL backlight panel test solution offers you the flexibility of using only one sensor or up to 10 sensors (maximum) in your test application. It thus offers you more alternatives for the number of test points you prefer to set up. Furthermore, the U2972A allows multipoint data checking and measurement, which allows you to check and measure at multiple test points simultaneously. This enables gives you faster testing response and testing speed than the conventional testing method, which uses only one sensor at a time. The conventional method requires users to test a point and move to the next test point to perform multipoint data checking and measurement. The Agilent solution can be used in the manufacturing environment to test the display panel quickly and easily.

For more information, go to www.agilent.com/find/U2972A or call your local Agilent office.

Related Literature

System Developer Guide - Using USB in the Test and Measurement Environment, Application Note 1465-12

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