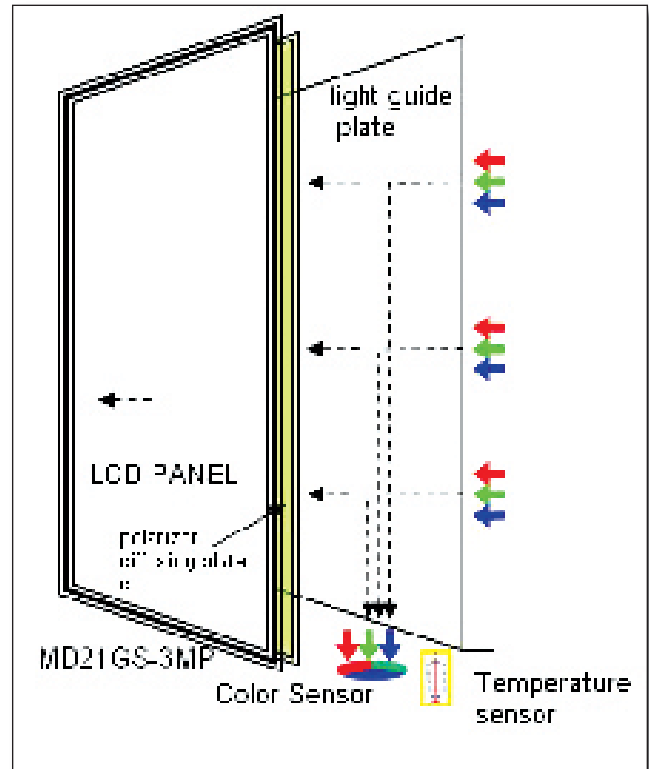


# Getting to the Point

*Luminance is critical to medical diagnostics, but what part does the whitepoint play?*

*The NEC MultiSync MD series have internal sensors for luminance, whitepoint and temperature that constantly monitor the output of the backlight. The light is monitored after it has been mixed in the light guide plate.*



- Lighting consistency is critical in a multi-monitor, diagnostic situation.
- Whitepoints will drift over time toward a yellow hue.
- Monitoring the whitepoint and adjusting for shifts in the whitepoint will allow each monitor to be consistent with other monitors in the configuration.

**R**adiologists are sensitive to calibration of their monitors. They must be. They also have to be able to trust what is being displayed on their monitors is as true as possible.

“Radiologists want monitors to represent a film on a light box as much as possible, and as accurate as possible, and light boxes have historically been bright and consistent,” says Todd Fender, product manager for medical devices for NEC Display Solutions (Itasca, IL).

Only a few years ago, radiologists were using CRT monitors that had to be calibrated every week because the phosphor degrades so rapidly over time. Today, with the mass appeal and acceptance of LCD technology, radiologists do not have to calibrate as often. But that does not mean that they are not concerned about differences in monitors.

## WHITEPOINT

One difference between monitors can be found in its light source, specifically the whitepoint, which is the color of light emitted by a light source. Even though a light source may be considered white, it may not have identical whitepoint characteristics. Most standard LCDs have an X, Y range of  $\pm 0.002$  — a subtle difference, but one that Fender says will make the monitors appear different.

“Radiologists do a diagnostic in a dual and sometimes triple configuration,” says Fender. “They look at an image on one monitor that may show a chest X-ray taken six months ago and compare to another monitor showing an image taken during one today. Did a growth increase in size? Has chemotherapy been working? If the two monitors have two different whitepoints, the radiologist might be losing something in the translation.”

## CCFL BACKLIGHTS

More than nine out of 10 standard LCD monitors use a cold cathode fluorescent lamp (CCFL), and the CCFL's whitepoint may vary in production lots. Most grayscale monitors are used in pairs or multiple-monitor configurations, and as a result, it is important that they have a similar appearance. If the whitepoint is different between the two monitors, the display may not be identical, despite the light output being calibrated to the same luminance.

"Using CCFL is good because it is efficient and low-cost," says Fender. "But it will degrade in different color spectrums. CCFLs will undergo a yellowing effect when they age; this is evident when you replace a light bulb. One bulb looks different than the other bulb."

In the diagnostic marketplace, color and the whitepoint are important to keep stable over a long period of time. "Radiologists must be confident that what they see on the first day is the same as it is on the 30th day or the 90th on up to 35,000 hours of life," Fender says. "That whitepoint must remain consistent."

## CONSTANTLY MONITORING

To keep it consistent, NEC uses a variety of technologies. For example, for its NEC MultiSync MD Series, the company uses what it calls X-light technology. X-light measures and adjusts backlight every 20 milliseconds (ms) using an internal calibration loop, which allows for the gamma factory calibration to be held. To monitor the process, three colors of CCFL backlights and three inverters are used.

The monitor stores in memory the factory calibration as the reference data for adjustment.

## LED-BACKLIT LCD DESKTOP DISPLAY

NEC Display Solutions launched its NEC SpectraView LCD2180WG monitor. The company says it is the first desktop display in the market to feature a light emitting diode (LED) backlight.

Using a combination of red, green and blue LEDs to produce the white light that makes up the backlight source for the display, the NEC SpectraView LCD2180WG monitor produces a broad color gamut without loss of luminance.

"Professionals with image-critical applications requiring exceptional color fidelity and image performance have been the last to make the transition to LCD displays," says Ray Froude, senior product specialist for NEC Display Solutions. "The NEC SpectraView LCD2180WG establishes a new standard in high-end LCD display performance, eclipsing the color reproduction capability of even the highest performing CRT monitor and more than satisfying the demanding image requirements of accuracy-dependent professional users."

NEC's super-fine TFT technology — in combination with the new LED backlight system — creates an ultra-wide color gamut, reaching over 100% of the Adobe, RGB and NTSC color scales. In comparison, fluorescent-based LCD monitors typically only cover around 70% of Adobe, RGB and NTSC while CRT monitors cover around 80%. The new LED backlight technology also reduces color/contrast shift problems that occur due to change in viewing angles allowing for a very stable, ultra-wide viewing angle. AI

“The loop sensor continually monitors the brightness and the whitepoint and when it sees either one fluctuate, it can send a pulse to what is controlling the backlight so that it can get back to that original state,” says Stan Swiderski, senior product development engineer for NEC.

The sensor’s temperature also is monitored because its performance will change with temperature fluctuation.

By being able to adjust the monitor to keep a consistent whitepoint, monitors can, in effect, be mixed and matched. Two to go and one to stow, is how Fender puts it. When adding a new monitor to a multi-monitor configuration, the new monitor can be calibrated to the same whitepoint and luminance settings as the original.

The monitor stores in memory the factory calibration as the reference data, which is used as a reference for adjustment. In theory, the monitor should hold this calibration for the life of the monitor. If the monitor ever needs recalibration, there are two ways to calibrate. Monitor matching and standalone DICOM-GSDF calibration using just the monitor and an external sensor.

Monitor matching can be done using a USB port on the monitor itself. This can also be used when images are being shown at two locations, which is quickly becoming more commonplace. AI

