

White Paper

Why is calibration at the center of a display important? -Introducing the GeniSPOT[®] external calibrator

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Preface

Calibration is the most critical factor to ensure accurate and reliable diagnostic images. Monitors must be calibrated regularly to maintain image display consistency and compensate for discrepancies caused by the LCD characteristics. In recent years, the proliferation of hardware calibration tools in radiology has made daily measurement for viewing better images. Some medical monitors have internal sensors placed at the corner of displays for luminance measurement and DICOM curve calibration. However, since most LCD screens are not uniform, calibrating the screen at the center of the display provides more accurate results.

This paper will briefly explain the advantages of measuring the DICOM conformity at the center of display and further introduce some of the features of the GeniSPOT[®] external calibrator.

Why measuring at the center of a display?

LCD screens are not perfectly uniform. Normally there is a 30% difference in uniformity between the center and the corner of the screen. The dynamic range of luminance in the corner areas is very small, making calibration of the screen at the corner of the display is difficult. For example, when measuring grayscale luminance of grayscale at the corner of a display, only limited gray levels can be detected. Thus, it is hard to measure correct luminance for each gray level. Following we will show the difference of luminance at center and the corner area.

A USB photometer measures the quality of a display from the center of the screen. Figure 1 shows the typical luminance measuring process for gamma correction of a monitor. A Konica Minolta's CA-210 color analyzer is used to get some DICOM curves, contrast responses and the standard deviation from both the center and the corner of a display.

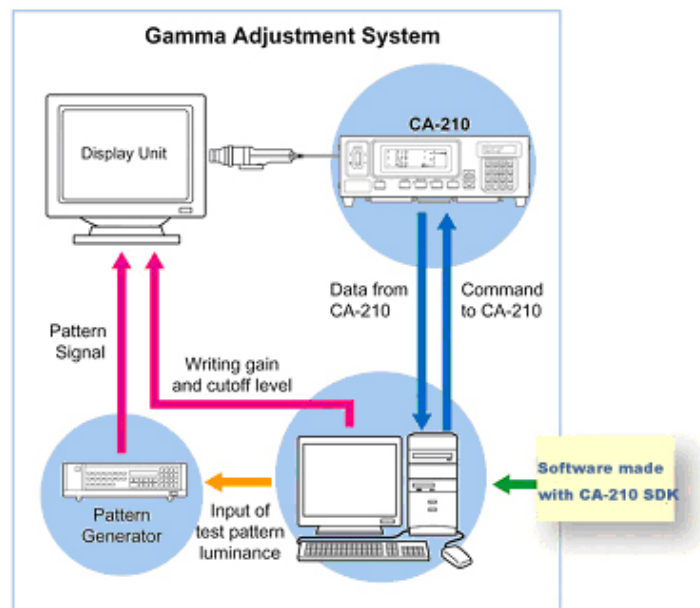


Figure 1. The process of gamma calibration from Konica Minolta CA-210 photometer

Figure 2 shows the results when measuring from the corner of a display. We got the luminance response with 18.6% max error rate, contrast response with 19.2% max error rate and the LUM & Fit standard deviation which is not conforming with perceptual linearity of GSDF (Grayscale Standard Display Function). From the test results, we find out measuring at the corner is hard to meet DICOM

standards.

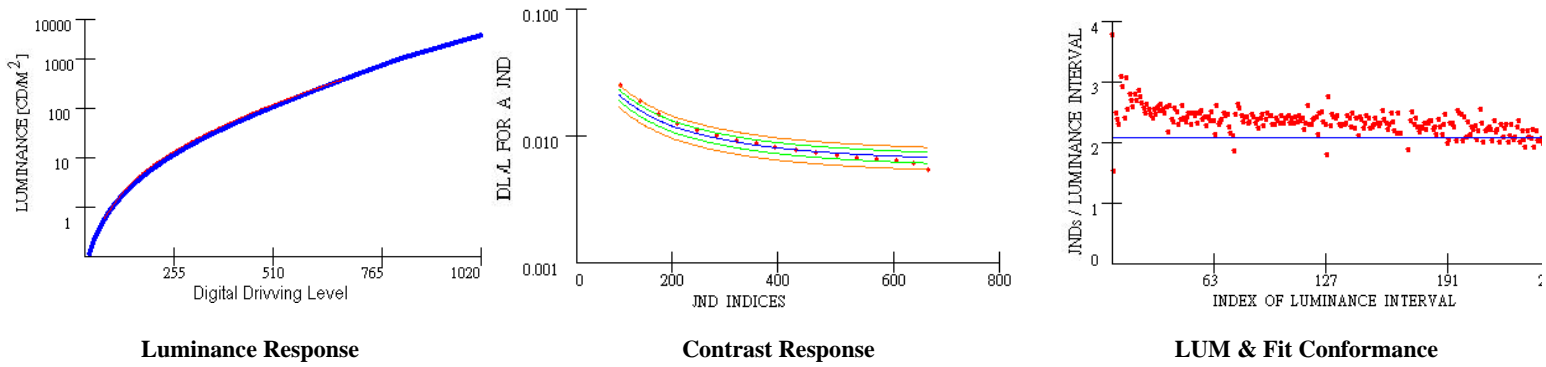


Figure 2. Test results when measuring at the corner

Figure 3 shows the results when measuring from the center of a display. The luminance response has a 3.3% max error rate, contrast response with 4.3% max error rate and the LUM & FIT standard deviation which is conforming with perceptual linearity of GSDF (Grayscale Standard Display Function).

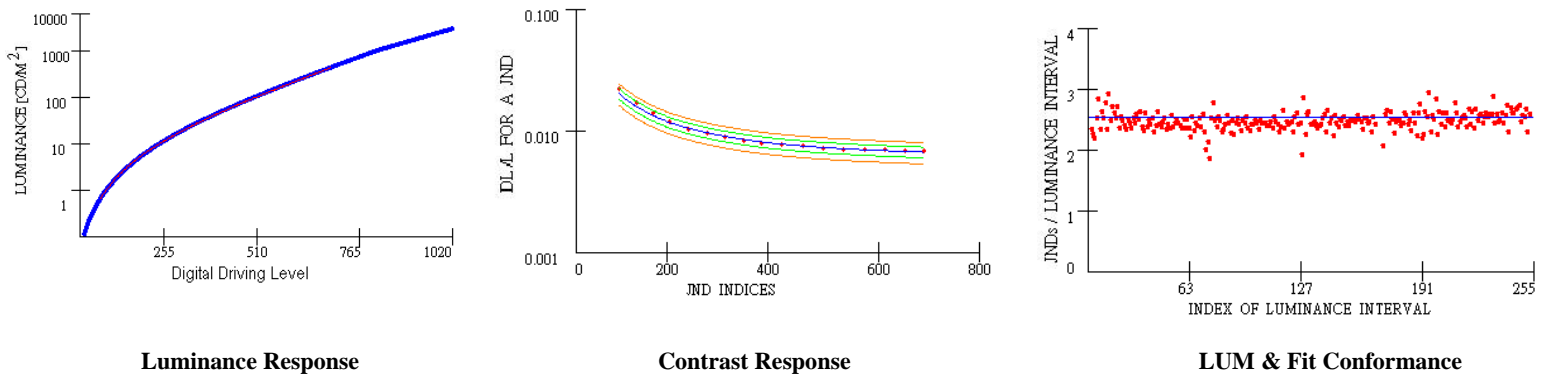


Figure 3. Test results when measuring at the center

From the above test results, we get smaller deviation at luminance response and contrast response when measuring at the center of a display. The LUM & FIT standard deviation conforms better with perceptual linearity of GSDF (Grayscale Standard Display Function) as well. The measurement proves that it's better to do calibration at the center of a display to get more consistent and accurate image results.

About GeniSPOT® external USB calibrator

GeniSPOT® is a USB 2.0 external calibrator which is placed at the center of a LCD monitor to measure the display characteristics. From the test results discussed in previous section, GeniSPOT® external calibrator can get more accurate measuring values than most of the internal sensors installed at the corner of displays. The GeniSPOT® integrates multiple functions inside, including luminance and DICOM calibration, ambient light adjustment and self-diagnosis function. The easy plug-in external calibrator allows easier daily calibration, ensuring more consistent images for diagnostic applications.



■ Luminance Calibration

The built-in sensor calibrates the brightness shift for a LCD monitor. The luminance calibration ensures the best uniformity of a LCD screen which creates better image viewing experience.

■ DICOM Calibration

Together with GeniPASS® software utility, the GeniSPOT® calibration system provides DICOM calibration, acceptance testing and constancy testing, ensuring the display conforms to AAPM TG-18, DIN 6868-57, IEC 6122-3-3-5 and JIS Z4752-2-5 standards.

■ Auto-Dimming Function

The integrated luxmeter dynamically detects the ambient light of the reading environment and optimizes the monitor luminance with the change of light conditions.

■ Self-Diagnosis

The intelligent self-diagnosis function ensures the GeniSPOT® photo sensor functions perfectly and accurately when doing the calibration of the LCD display.

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