

LED Dot Correction Controller

Summary of Product

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What is this product?

This product is the measuring instrument which used the technology which measures the brightness and chromaticity of the object analyzed by an image from the CCD camera.

The general brightness measuring instrument must measure an object one by one, because those measuring instruments adopt the “spot measurement method”. Therefore, the more measure points there are, the more time and the labor are necessary for the measurement.

Because this product can measure the brightness and chromaticity of the entire object by one measurement, the measurement time can be greatly shortened. It is a merit of this product.

Because CCD camera and the lense can be changed according to the measurement usage, and it is possible to correspond to various inspections by a minimum equipment composition, this product becomes low-priced.

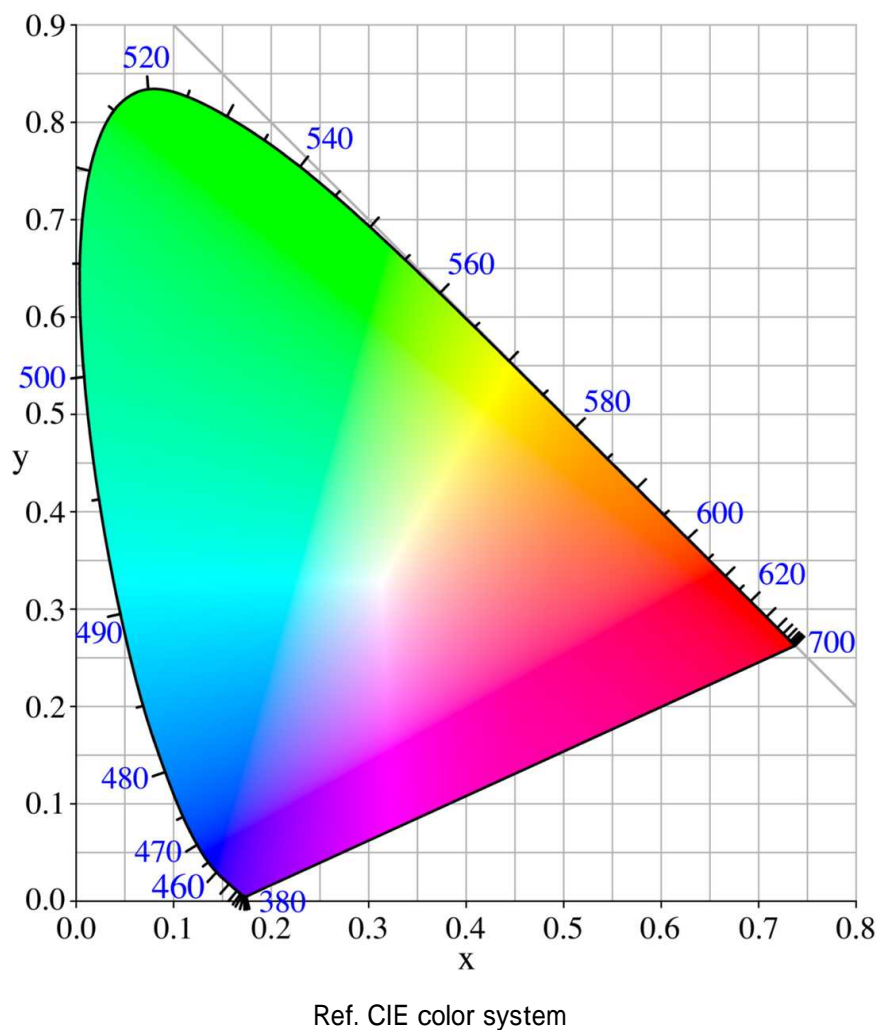


Example of composing

Measurement technique of brightness and chromaticity

In general, the CIE XYZ color system is used for the technique quantifying brightness and color. The data output from CCD camera is the unique RGB form of the camera. Therefore, to express the RGB output of the camera by the XYZ color system, a correlation between the CIE XYZ value (the psychophysical quantity which was output by the color brightness-photometer which was proofread) and the RGB value is necessary.

By accumulating these correlated parameters, this product can measure various objects by one system.



Main Feature

Analysis and Dot Correction

It measures brightness and chromaticity in the range which is established in the image from CCD camera. Also, it is possible to display a result of brightness distribution, or to display a result of analysis every pixel.

And it corrects the output to LED to become the brightness of the target.

As the other option, it can adjust the white balance.

Outputting Data

The analysis result and the operation log can be output in the file of the csv form.

Also, it supports optionally the function to output the synchronizing signal to another connected device.

Random Noise Correction

By the equalization of the image, it revises the random noise which is caused by the CCD camera and the camera lens. The measurement accuracy improves when the acquired image is increased at measuring it once, and time necessary for the measurement increases, too.

Because the number of the image acquired in one measurement can be freely set at this product, an appropriate setting can be chosen by comparing necessary accuracy with the time to the measurement.

Angle of View Correction

The brightness distribution measured with the CCD camera is influenced by the angle of view.

1) Angle of View of Display

When LCD is seen from the diagonal, brightness decreases and a specific color becomes hard to see by the characteristic of LCD.

2) Angle of View of Camera Lens

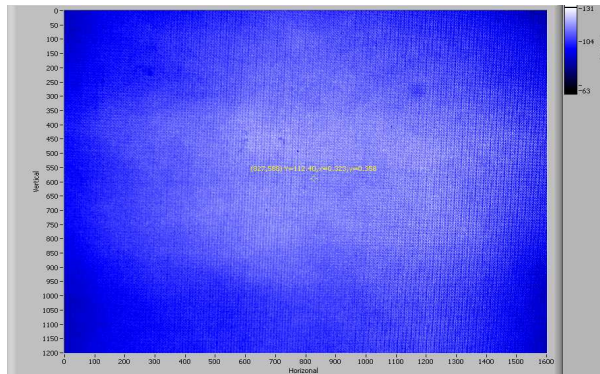
In case of the ideal optical system, "cosine fourth law" occurs.

This means the higher image high becomes, the darker the image-surface becomes.

In this system, it corrects the influence of the viewing angle, and has

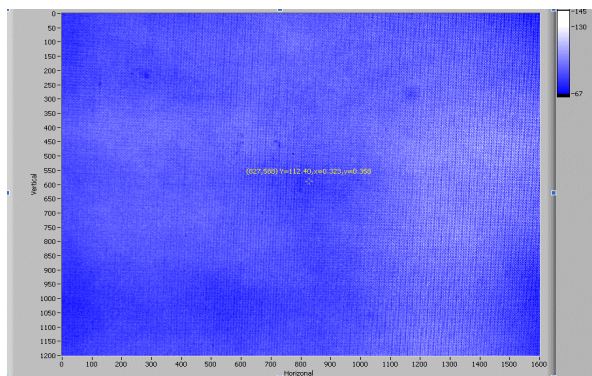
improved the analytical accuracy.

The following figure is the example of the correction of the viewing angle. The thicker the blue is, the lower the brightness is. Before the correction, the brightness is as low as that the distance leaves a center, but after the correction, the brightness distribution becomes uniform.



[Before]

The corners of the image are darker than the center.



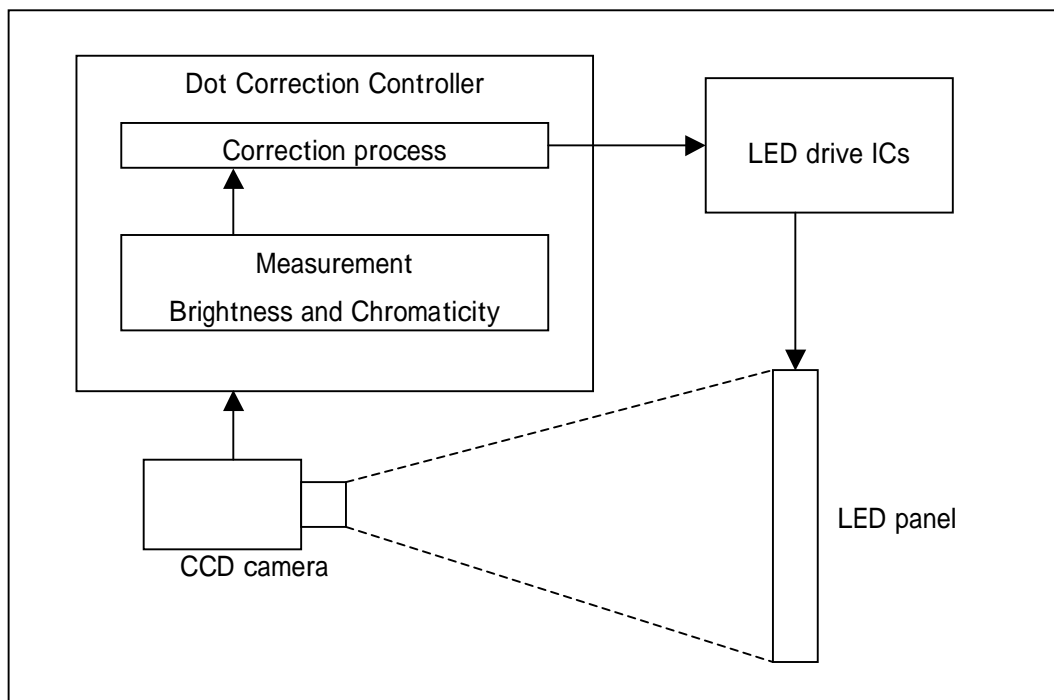
[After]

The corners and the center are almost the same brightness.

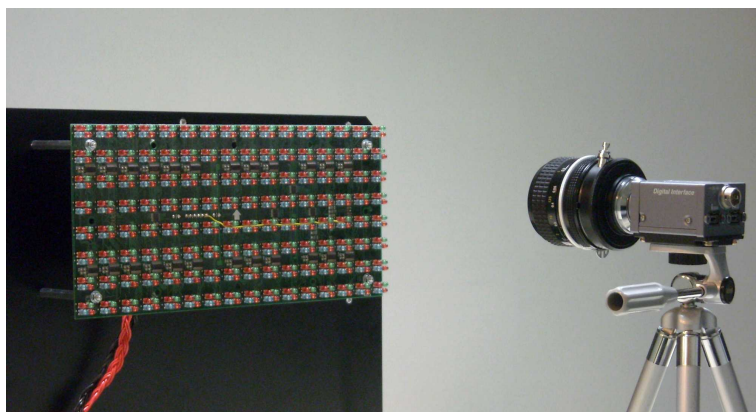
Correction System for LED panel

Even if it is the same manufacturer, the format to be the same, the brightness and the chromaticity of the LED have a little looseness. Therefore, it is necessary to correct the output to each LED to do the distribution of the brightness and chromaticity of the LED display uniformly.

If applying this system to this problem, it cancels a difference of brightness: it grasps the difference of the brightness of each LED from the measuring result, and then it adds a feed-back-control for them to become uniform and corrects a power level.



Block diagram of Correction system for LED panel



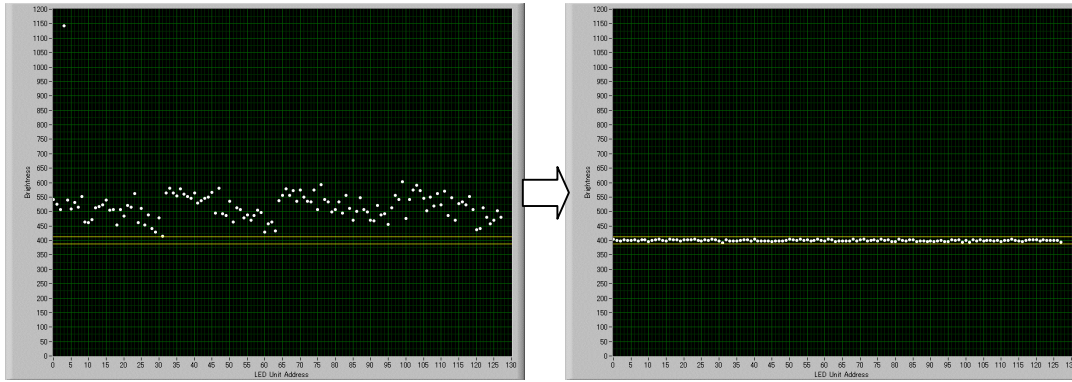
Example of measurement

Result of Dot Correction

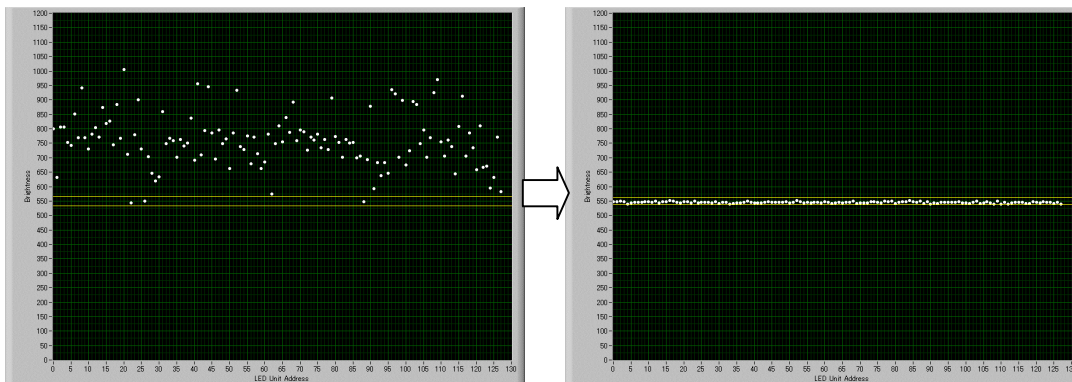
These are the example which corrects a LED panel actually.

< Mono Correction >

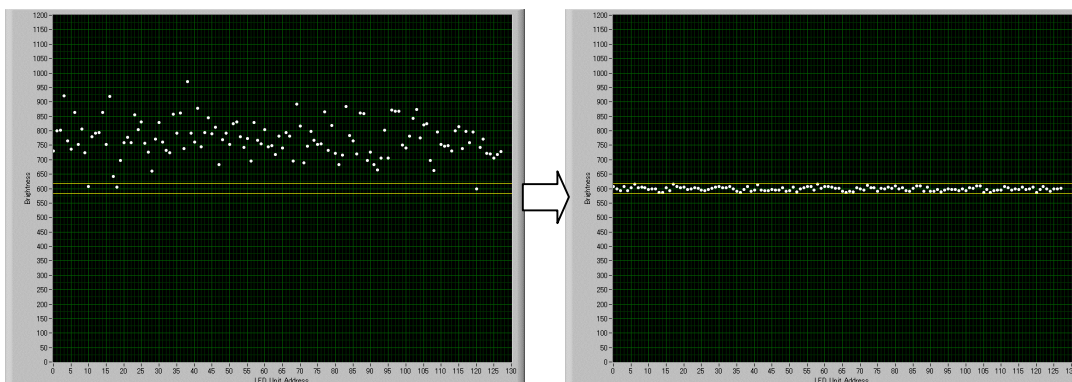
RED



GREEN

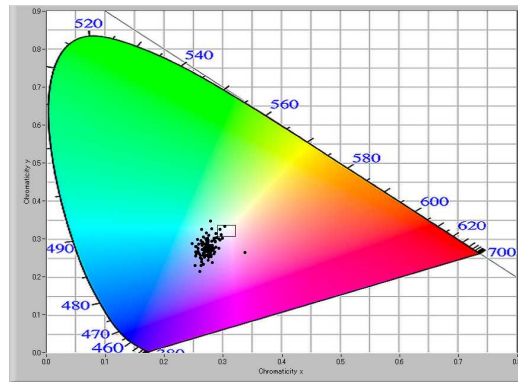


BLUE

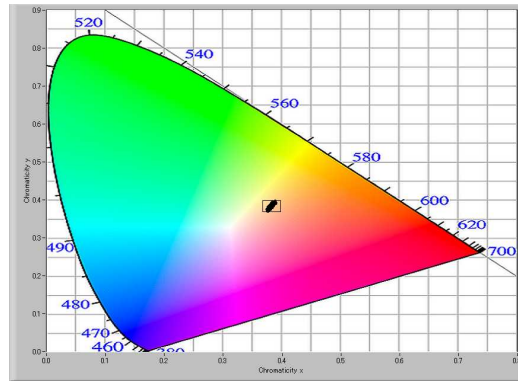
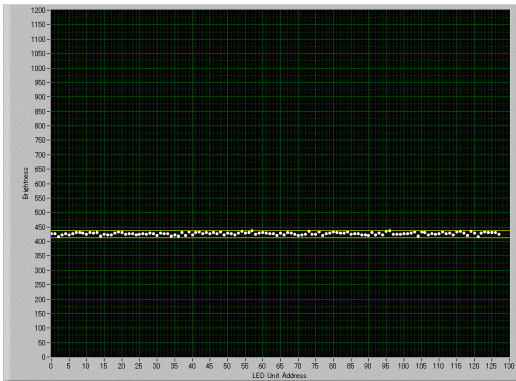


< Color Correction >

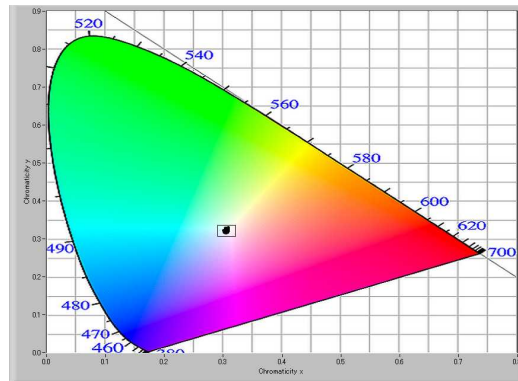
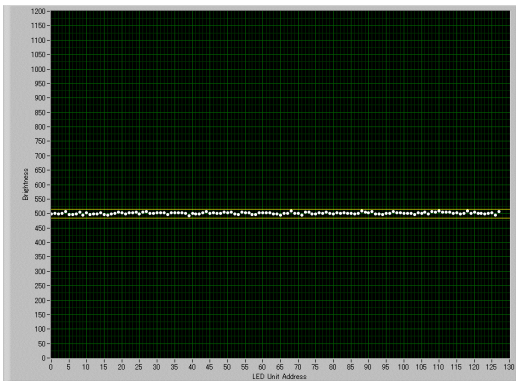
Before Correction



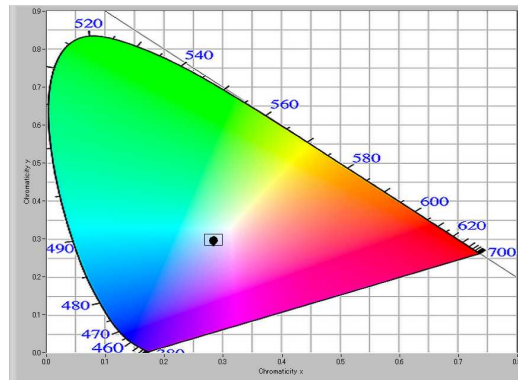
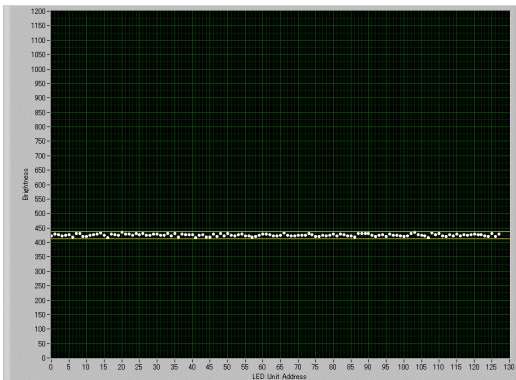
The target is 4000K



The target is 7000K



The target is 9300K



Typical Specifications

2-Dimensional Measurement Capabilities	Luminance CIE Chromaticity Coordinates
Units	Cd/cm ² , Cd/m ² CIE (x, y)
CCD Resolution	1600x1200
CCD Camera A/D Dynamic Range	10bit = 1,024 grayscale levels
Luminance Range	0.01 nit minimum 10 ¹⁰ nit maximum with ND filters
System Accuracy	Luminance (Y) ± 3% Chromaticity Coordinates (x,y) ± 0.003
Short Term Repeatability	Luminance (Y) ± 0.5% Chromaticity Coordinates (x,y) ± 0.001
Minimum Color Measurement Time	3 seconds (1600x1200)
Camera Field of View (FOV)	1600x1200 CCD 3 to 50 degrees
Camera lense	14 – 300mm
Dimensions	95mm (H) x 95mm (W) x 290mm (D)
Weight	2.0kg
Operating Temperature	0 – 30°C
Operating Humidity	20 – 70% non-condensing
etc	Camera cooled by Peltier elements