Luxeon Dynamic Color Control (DCC) for LCD Backlighting

Introducing Luxeon DCC for Backlighting:

Luxeon is a revolutionary, energy efficient and ultra compact light source that combines the lifetime, robustness and reliability of light emitting diodes (LEDs) with the brightness of conventional lighting.

When used as the light source for an LCD backlight, Luxeon DCC light sources offer dramatic advantages over conventional lighting and other LED solutions. Luxeon DCC enables manufacturers to deliver displays that are brighter, more colorful and robust than ever before possible and with clear competitive advantages in the market place.

Example of a Luxeon DCC light source

Specific Applications

- Desktop Monitors
- Medical Imaging
- Transportation Displays
- Avionics
- Desktop Publishing
- Television

Benefits of Luxeon DCC for Backlighting

Vivid Colors from Saturated Red, Green, & Blue Luxeon Light Sources
Using Luxeon DCC, images on the LCD display become more vivid with superior color saturation. Industry leading performance makes Luxeon DCC ideal for LCD televisions and high-end graphics, multi-media and medical monitors.

Reduced Motion Artifacts via Fast-Switching LED Technology
Because CCFL LCDs have slow response times, fast moving images can appear blurred. To eliminate this distracting effect, the backlight must be switched on/off faster than the LCD. Luxeon DCC powered backlights can blink several orders of magnitude faster than the LCD and minimize the blurring. Traditional light sources cannot come close to Luxeon DCC's performance without compromising brightness or lifetime.

Traditional Backlight

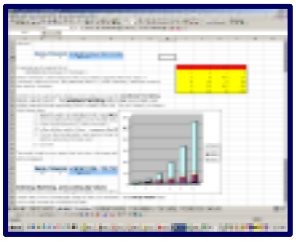
Luxeon-RGB

Optimized Color and White Point Settings

Manufacturers of multi-media monitors typically set their white point to 9600K. This white point is most suitable for computer applications such as spreadsheets and word processing. However, for video applications such as movie viewing, the optimal white point is 6500K. Currently, LCD displays achieve this lower temperature white point by reducing the gray scale of their blue and green colors which results in a loss of color contrast. When Luxeon DCC is used, the RGB mixing can be controlled dynamically and the white point can be reduced from 9600K to 6500K while maintaining excellent color contrast.

Backlight Panel Consistency

The ability to dynamically adjust the white point is also of great benefit to display manufacturers requiring panel-to-panel consistency. Consistency can now be achieved automatically using optical feedback software tools. Optical feedback maintains a consistent color target over the lifetime of the monitor providing significant value to the online retail, desktop publishing and printing industries where color consistency is critical for success.



Spreadsheet: 9600K

Movie: 6500K

Full Gray Scale with Real-Time Dynamic Brightness Control

When viewing movies on an LCD display that uses CCFL backlighting, a sudden change from a bright picture to a dark picture results in poor color contrasting because the backlight is unable to respond to the change in lighting and must be compensated by the LCD. Using Luxeon DCC, the backlight intensity can be controlled and dynamically respond to the video signals resulting in better overall contrast and an enhanced viewing experience.

CCFL

Luxeon DCC

Ruggedized for Automotive, Industrial, Avionics and Military Applications

Unlike traditional backlights, there are no fragile components to break, even if abused. With Luxeon DCC, monitors can be sealed for life, eliminating the need to replace the backlight. Luxeon DCC's superior brightness coupled with infinite dimming capabilities enables high visibility in bright daylight environments and minimal glare in dark environments. Even in extreme cold temperatures (-55°C), Luxeon DCC maintains its instant-on and brightness capabilities without the need for external heaters. Additionally, Luxeon DCC utilizes low voltages thereby reducing EMI and eliminating the need for high voltage TCO approval.

Environmentally Friendly

Luxeon products do not contain any mercury or toxic gases. The durability and longevity of Luxeon products also result in less waste.

LCD Display Applications and Assembly

LCD Display Applications

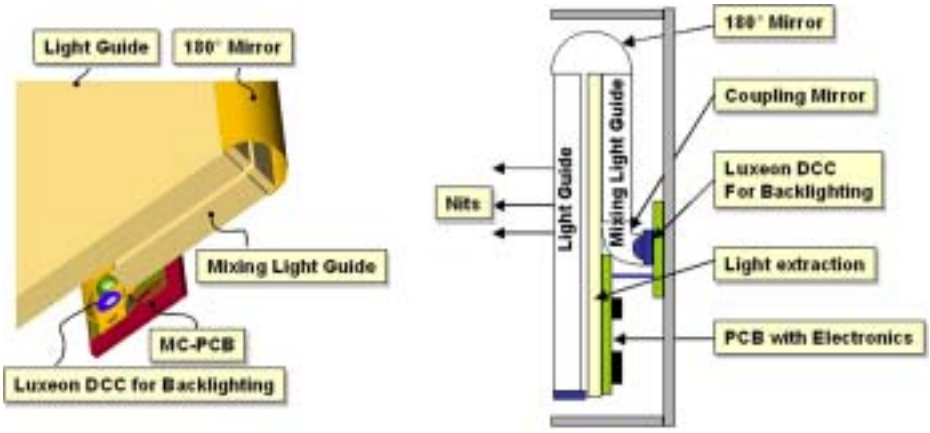
Different LCD sizes, resolutions and aspect ratios require different Luxeon DCC light sources. The table below summarizes the standard light sources suggested for several common LCD configurations and whether the light source should be implemented at the bottom (B) or the side (S) of the display. In addition to the light source, a driver will be needed to power the light source. These current drivers can be passive or controlled by an optical feedback mechanism using a sensor and a processor for control.[1]

		Display Size & Aspect Ratio							
Light Source	Size (mm)	5" 4:3	7" 16:10	8" 4:3	8.4" 4:3	10.1" 4:3	12.1" 4:3	15.0" 4:3	18.1" 4:3
MGAA	99 x 32	B	S						
MGBA	153 x 32		B	B	B	S			
MGCA	225 x 32						B	S	S
MGDA	306 x 32							B	
MGEA	360 x 32								B

S = Luxeon DCC Light Source implemented on the side of the display
B = Luxeon DCC Light Source implemented on the bottom of the display

Luxeon DCC Light Source Backlight Assembly

The assembly of an LCD backlight using Luxeon DCC differs from backlight assemblies using CCFL. The diagrams below show one possible method of creating such a system.[2]



One possible backlight implementation using Luxeon DCC

[1] The optical sensor, processor and driver are not part of the Luxeon Light Source product. Lumileds has provided information on these piece parts on the Lumileds website, www.lumileds.com.

[2] Detailed design information, including a documented reference design is included in an application note currently under construction.