

JANUARY 2015

ASUS Eye Care Technology White Paper



Eye Care

ASUS EyeCare Technology is a brand name built on two fundamental technologies that help prevent Computer Vision Syndrome (CVS); Flicker-free and Low Blue Light. The two are complementary and the best strategy in reducing CVS, as the increasing reliance on smartphones, tablets, laptops and PCs in all aspects of everyday life puts us in front of displays for an increasing number of hours. With pro-longed use, the issue of user comfort and eye health becomes an increasingly issue and users are keen to ensure they avoid any possible discomfort or health issues.

While a myriad of factors can affect eye health and comfort when using a display, several require user interaction and setup optimally; including brightness level, color calibration and ambient lighting from the surround environment. However both Flicker-free and Low Blue Backlight technologies are a part of ASUS' R&D arsenal to bring eye health benefits to ASUS monitor users.



ASUS will continue to introduce display products including flicker-free, low blue backlight technologies and anti-glare coating under the ASUS Eye Care branding.

ASUS Eye Care Branding



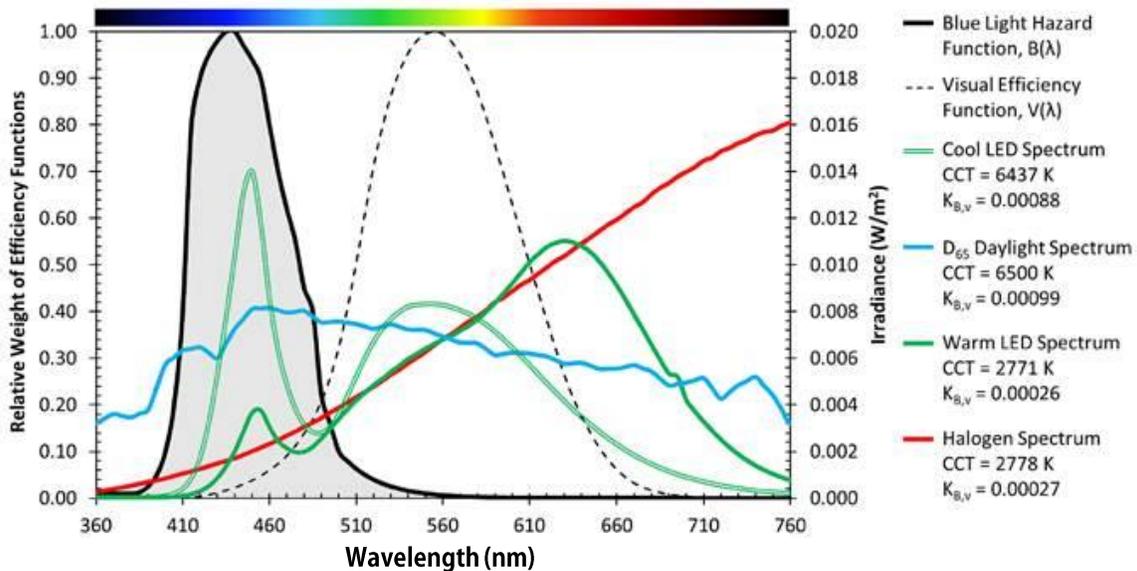
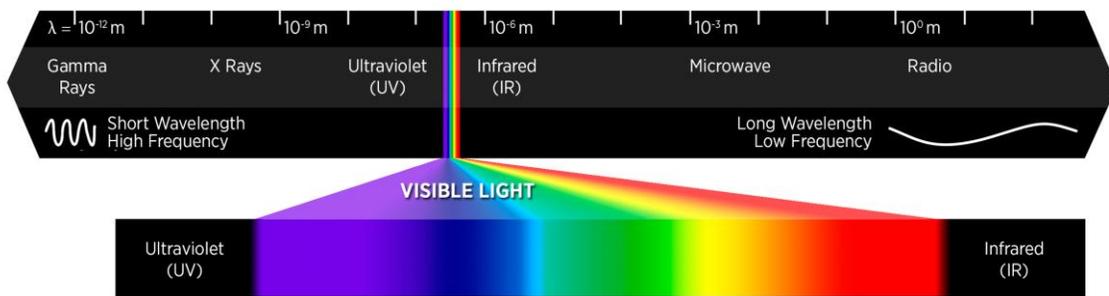
ASUS Low Blue Backlight

How does 'blue light' damage your eyes?

The retina within the human eye interprets electromagnetic waves with frequencies between ~380nm and ~780nm as colors between purple-blues through to deep-reds.

Shorter wavelengths corresponding to the blue-purple end of the spectrum yield more energy; therefore the sensitive retina material can withstand proportionately less of this energy before damage occurs. The **American Macular Degeneration Foundation** notes that "Recent studies suggest that the blue end of the light spectrum may also contribute to retinal damage and possibly lead to **AMD**".

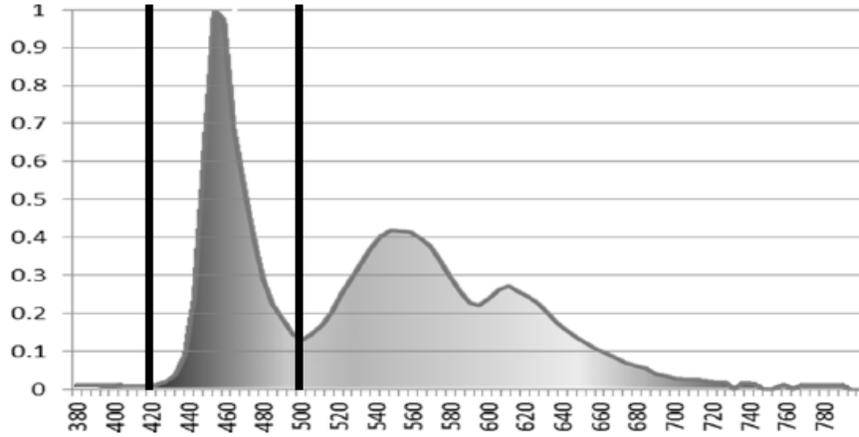
Even while not being able to cause physical harm to eye or skin, blue-light exposure can impact our psyche and natural day-night rhythm (circadian rhythm) causing an improper or disturbed sleep pattern, affecting overall health.



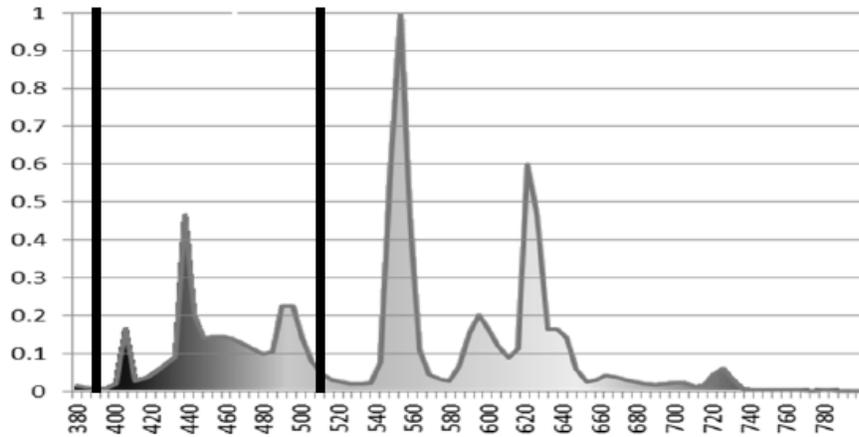
Specifically a 'blue' wavelength that extends from approximately 380–540 nm, with a peak at 435–440nm is particularly damaging to the retina.

Unfortunately the damaging wavelength corresponds to roughly the peak emission factor from WLED backlights.

LED Backlight screen



CCFL Backlight screen

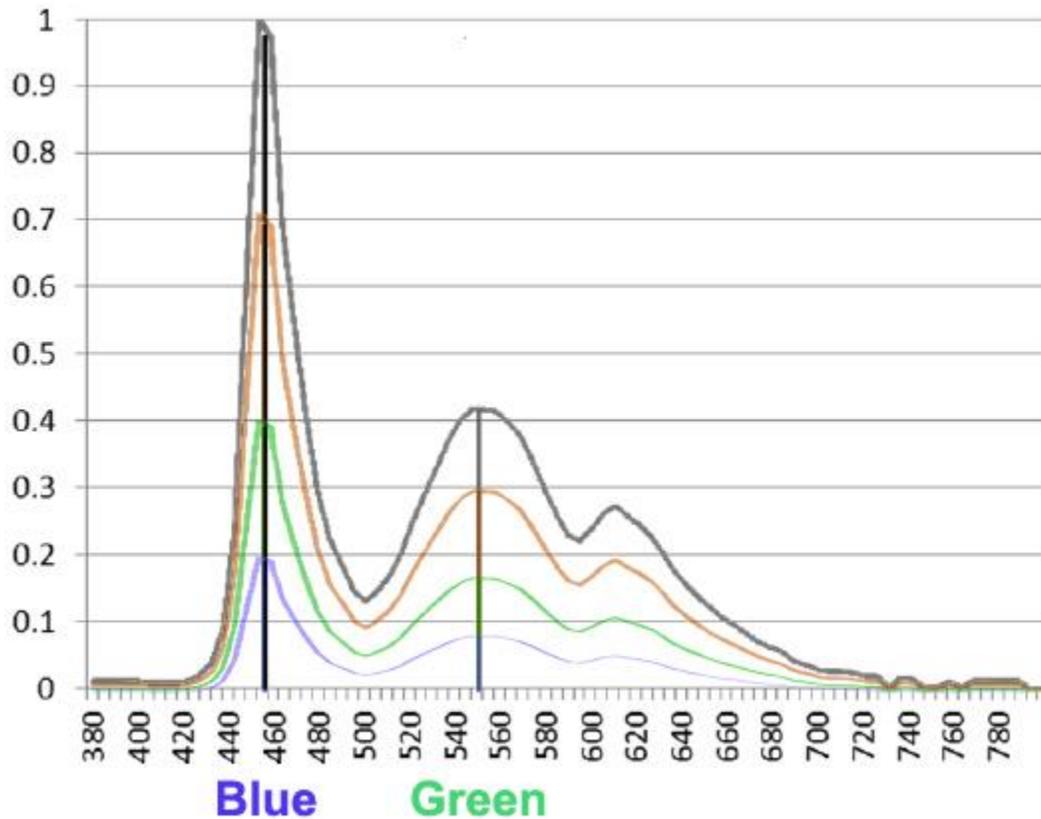


What does ASUS do to reduce 'blue light' emissions, while retaining the balance of color reproduction?

ASUS reduces the visible blue-light as part of its color-correction process when validating the display. The ASUS display processing CPU inside receives the data from the PC graphics card and modifies the display output to reduce the percentage of blue color displayed by the TFT LCD, thus reproducing the color *and* reducing the blue light intensity together.

As this technique can only reduce blue light intensity so far, it is used in conjunction with reductions in backlight intensity. The blue light intensity decreases but the ratio of light frequencies remains the same, so color quality is retained while simultaneously reducing blue light exposure.

Shown below is a visual example of how the intensity of blue to green peaks reduces as the backlight brightness drops.



What functions does ASUS monitors offer to reduce 'blue light'?

Within the display menu, the Blue Light Filter offers four levels that can be changed at any time:

- Level 0: No change
- Level 1~4: With Level 4 offering the most filtering and least brightness

Between Level 1 to Level 3, the Brightness and Color Temp. functions within the ASUS monitor OSD are user-configurable, however Level 4 is an optimized setting for compliance with TUV Low Blue Light Certification, offering the most blue-light protection.

