High contrast ratio and appropriate brightness are the essentials for great viewing. Acer LCD monitors feature varying degrees of brightness and larger contrast ratio for perfect image rendering and a stunningly clear view of text, graphics and HD video. Choose an LCD monitor designed to suit specific ambient light and viewing distances.

**Different brightness levels for different ambient light and viewing distances**

According to TCO'03/TCO'99 and ISO 13406, the minimum required brightness levels for LCD monitors are 150 cd/m² and 100 cd/m² respectively. This standard was based on an eye-to-monitor distance of 50 cm, and zero degree ambient light.

Recently, however, different usage scenarios have emerged wherein ambient light and viewing distance are quite varied. With this in mind, Acer now offers LCDs with varying brightness, each designed for the specific usage scenarios described below:

- **Public areas (department stores, hospitals, transit stations)**: High-level brightness LCDs (300 cd/m² and above) are recommended for normal ambient light and viewing distances of around 60 cm.
- **Offices**: Mid-level brightness LCDs (250 cd/m² to 300 cd/m²) are recommended for normal ambient light and viewing distances of around 40 cm.
- **Study rooms**: Low-level brightness LCDs (200 cd/m² to 250 cd/m²) are recommended for lower ambient light and viewing distances of around 50 cm.
- **Study areas (in desktops, laptops, etc.)**: Low-level brightness LCDs (150 cd/m² to 200 cd/m²) are recommended for lower ambient light (e.g. desk lamp) and distances of around 50 cm.
- **High contrast ratio for perfect image rendering and a stunningly clear view of text, graphics and HD video. Choose an LCD monitor designed to suit specific ambient light and viewing distances.**

**How does appropriate brightness enhance LCD applications?**

- **Text, spreadsheets and engineering layout (lower-level brightness)**: For users who focus on large amounts of text and highly technical diagrams for long periods of time, appropriately bright LCDs can save eye-strain. Artwork rendering, gaming and HD entertainment, outdoor viewing (higher-brightness): For applications that are meant to display vivid images, high-brightness optimizes the application’s performance. For outdoor viewing, high-brightness displays images clearly without color wash-out.

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**What is brightness?**

Brightness refers to the emitted luminous intensity on screen and is measured in candelas per square meter (cd/m² or nits). A higher cd/m² or nit value means higher perceived brightness.

**What is contrast ratio?**

Contrast ratio is the ratio between the whitest white and the blackest black that can be produced. It is expressed in the form of 400:1, for example.

- **High contrast ratio intensifies the contrast of color palettes in art rendering applications.**
- **Low contrast ratio manifests itself in the lack of true black and blurry text.**

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Understanding panel technology: contrast ratio improvements

Maximum brightness (whitest white) level:
As mentioned above, brightness can be improved via improvement to the backlight module, TFT/Color Filter BM layout and LC systems.

Minimum brightness (blackest black) level:
The actual reduction of the blackest black is critical to the contrast ratio. Even a small adjustment in the blacker black will cause a huge enhancement to contrast ratio while similarly small adjustments to the luminance level will have little effect. Adjustments to the backlight to make a Color Filter (CF) material, different LC driving systems, and anti-reflection coating.

Acer CrystalBrite™ technology (Glare-coating)
Conventional LCDs diffuse internal lamp light that will reduce brightness. Acer CrystalBrite™ technology features a glare-coating that reduces light diffusion without diminishing brightness so that images are displayed with clear, clean edges and vibrant color.

Acer CrystalBrite™ technology includes an anti-reflection coating that enhances the contrast ratio and sharpens images. With this anti-reflection coating, ambient light is absorbed, reducing its effect on the blackest black.

Improvements to the Color Filter (CF), polarizer and PI alignment layer material:
A man black can be achieved by using color-resistant materials in the Color Filter. This prevents light leakage in the dark state. Improvements can also be made to other materials such as the polarizer and PI alignment layer.

Understanding panel technology: contrast ratio improvements

Dynamic contrast ratio
For panels that support backlight modulator parameters and Gamma correction adjustment, dynamic contrast ratio is used to measure contrast ratio improvements. Current contrast ratio represent average panel performance on a static image, that is, backlight modulator parameters and Gamma correction are fixed while the measurements are made. But most images are not static, and fixed parameters do not reflect what the user perceives. Dynamic contrast ratio measures performance for dynamic states. In dynamic contrast ratio, the whitest white and blackest black levels are measured separately at the highest and lowest possible brightness levels that a display can reach while displaying both bright and dim images. The distinction between contrast ratio and dynamic contrast should be labeled for end-users’ reference since the different measurement techniques make comparison between the two types meaningless.

Acer CrystalBrite™ technology (Anti-reflection coating)
Acer CrystalBrite™ technology includes an anti-reflection coating that enhances the contrast ratio and sharpens images. With this anti-reflection coating, ambient light is absorbed, reducing its effect on the blackest black.

The process of dynamic contrast ratio is as follows:
1st: Measure the input image gray level histograms to get the Mode value. If the most frequently occurring counts are distributed in the darker area, then the backlight will be modulated to a lower level and power will be conserved. LCDs with directing backlight can achieve the partial control to reach higher contrast ratio. LCDs with CCFL backlight are easier to divide into more sub-bursts with independent brightness control and reach much superior dynamic contrast ratio compared to LCDs with CCFL backlight.
2nd: Adjust the Gamma curve slightly according to Mode value. If the most frequently occurring counts are distributed in the darker area, then the slopes will be higher at the darker grey level and reflect more dark detail on the dimming image.
3rd: Adjust the backlight to proper luminance range according to Mode value. If the most frequently occurring counts are distributed in the darker area, then the backlight will be modulated to a lower level and power will be conserved.