High Contrast Ratios Bring Your Vision to Life

What is contrast ratio?

'More so than color (quantum dots or otherwise), resolution (4K or otherwise) or other aspects of picture quality, contrast makes the difference between a good- and a bad-looking image.'

GEOFFERY MORRISON, TECHNICAL EDITOR OF HOME THEATER MAGAZINE

Quote source

Contrast ratio is the measure of the difference between the whitest white and the blackest black. It is what helps differentiate between different shades of black and what makes the details of an image stand out.

Contrast ratio is expressed as the brightness put out by the “white” part of the screen in footlambert (fl) to the brightness put out by the “black” part of the screen. It’s typically written as a ratio of some number to one.

For example, Samsung Display offers a PID panel that has a contrast ratio of 5,000:1, meaning that the whites are 5,000 times brighter than the blacks, which in turn, means excellent legibility and visibility even in high ambient light environments.

Furthermore, contrast ratio gains importance since human eyes do not have an absolute measure of brightness; what we interpret as bright or dark is on a relative scale.

With a low contrast ratio screen display, the pictures look washed out. The picture quality is further impacted in well-lit rooms—the kinds that are most often used to display public information display (PID) products. In their research for The Journal of the Society for Information Display, Hsi-Hao Chung and Sun Lu say, “Usually the surface glare caused by ambient illumination can greatly reduce the contrast ratio of the LCD so that the displayed image may not be read easily.”

In dark rooms, higher contrast ratio panels provide deeper blacks and finer details, even in shadow regions, making them a better choice.

Ensuring that the panel has a high contrast ratio is crucial to the performance of LCDs in public information display applications as vital information on the screen might be missed, misinterpreted, or otherwise appear skewed by the user.

Benefits of high contrast ratio

When you insist on higher contrast ratio, you are securing these benefits:

- Your pictures feel more immersive
• Your colors stand out more and look brighter
• You can differentiate between shades of black, even in darker rooms
• You find it easier to read the display, especially in well-lit rooms and from a distance
• You avoid eye strain and fatigue

Bottom-line—if you are looking to deliver a quality product, you cannot ignore the contrast ratio.

Which display would you like? If you chose the one on the left, you clearly saw the benefit of the higher contrast ratio.

So what are the factors that influence contrast ratio?

The driver of contrast ratio is Native LCD technology: VA vs IPS vs TN.

Vertical alignment technology

Of all the native technologies available, from Twisted Neumatic (TN) to In-plane Switching (IPS), to Vertical Alignment (VA), or even the latest Super Vertical Alignment (SVA)—the VA and SVA are the undisputed leaders when it comes to contrast ratio. In VA panels, the liquid crystals align naturally to the glass, which produces a broader contrast. VA panels also minimize light leakage, which keeps backlight from passing through so the deepest blacks and brightest whites appear flawless and highlight better clarity and uniformity. As well, VA contributes to crisper contrast without using more power.

In addition, the contrast ratio is influenced by these external factors in the real environment:

• Display native brightness (backlight unit and transmittance)
• Polarizer treatment
• Ambient light conditions

In order to understand how the contrast property changes, we must look at how display brightness, low reflection coating, and ambient light contribute to perceived contrast ratios.
**Display brightness**

Display brightness is a key determinant of the contrast ratio in the real environment, as it directly counters the effects of external light upon the display. In order to maintain high-quality contrast ratios, the display’s contrast is in direct proportion to the luminance of the backlight. Specifically, in outdoor usage, Samsung Display offers the brightest panels available on the market today with luminosity levels as high as 5,000 nits, combating the detrimental effects of ambient light on the proficiency of the display.

**Polarizing treatment: low reflection coating**

Contrast ratio in the real outside environment is highly affected by the amount of reflection and glare, which is formally defined as, the luminance detected by the user due to the reflection and/or scattering of the ambient light from various surfaces in front of the liquid crystal layer, the effects of which are minimized with the use of the Samsung Display’s specialized anti-glare coating.

![No Polarizer Treatment vs Polarizer Treatment](image)

**Conclusion**

You should strive for a display solution that provides high contrast ratios that guarantee easily readable text and details in video or graphic images, benefiting the user no matter the application. The bottom line is getting the user to understand the message or invoke an emotion through the use of display.

Contrast ratio should be of the utmost importance in public information display in order to bring any creative vision alive or guarantee the preciseness of any message.

Find what high contrast displays can do for your business with Samsung Display’s solutions. Examine our product lines with high contrast ratios: [video wall], [indoor displays], [outdoor panels].