SAMSUNG’S ADVANCED MOTION BLUR REDUCTION TECHNOLOGY
Curved Gaming Monitor CFG70
Executive Summary

Pro-gamers, individuals who aspire to compete in the professional gaming industry, need to instantaneously detect and identify fast-moving objects. Serious pro-gamers have traditionally sought out hardcore gaming monitors that provide a superior advantage in computer gaming. Gamers actively look for the best monitor with a fast response time, no motion blur, and a wide peripheral view. However, current LCD monitors have some limitations in reproducing a fast response time, compared to older CRT monitors. Some gamers still prefer to use older CRT monitors instead of LCD monitors for first person shooter (FPS) games.

Characteristics of Cathode Ray Tube and LCD monitors

Older cathode ray tube (CRT) technology moves an electron beam back and forth across the back of the screen that lights up phosphor dots on the active portions of the screen. CRT monitors provide fast response times and no motion blur; however, despite the advantages, they have been eclipsed by the benefits in size, weight and lower energy consumption that LCD monitors offer. Motion picture quality of most of present LCDs is not sufficient for high speed live images due to the following 2 reasons: 1) the slow response time of liquid crystals, and 2) the hold-type temporal rendering method of LCDs combined to the smooth pursuit eye movement of the human visual system.

![Diagram showing the difference between typical CRT and typical LCD](image-url)
**Types of LCD panels**

Gaming monitors use different types of LCD panels: Twisted Nematic (TN), Vertical Alignment (VA) and PLS (Plane to Line Switching)/In-Plane Switching (IPS).

**TN Panel Technology:** Twisted Nematic (TN) panels are low cost and often used by gamers due to the fast pixel response time and high refresh rates; however, color shifting occurs when viewed from an angle.

**VA Panel Technology:** Vertical Alignment (VA) screens can display deep blacks, have a high static contrast ratio, and produce robust colors; however, noticeable motion blur artifacts hinder gaming performance.

**PLS/IPS Panel Technology:** PLS (Plane to Line Switching) panels and In-Plane Switching (IPS) panels have wide viewing angles, reliable color quality, and a strong grayscale performance; however, they are subject to motion blur with a pixel response that is slower than TN panels. Previously, curved monitors in the gaming market were built on either VA or PLS/IPS panels that have too slow of response times (between 4ms to 6ms) for FPS games or PC Action Games.

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<thead>
<tr>
<th>Panel Type</th>
<th>Pros</th>
<th>Cons</th>
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<tbody>
<tr>
<td>TN Panel</td>
<td>• Low cost</td>
<td>• Color shifting</td>
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<tr>
<td></td>
<td>• Fast pixel response time</td>
<td>• Viewing angle</td>
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<tr>
<td></td>
<td>• High refresh rates</td>
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<tr>
<td>VA Panel</td>
<td>• Deep black</td>
<td>• Motion artifacts</td>
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<tr>
<td></td>
<td>• High static contrast ratio</td>
<td>• Slow pixel response time</td>
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<td></td>
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<td></td>
<td>• Strong grayscale performance</td>
<td>• Light leakage at corner</td>
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**Measurement of Response Time**

Response time is the time a pixel in a LCD monitor takes to move from one value to another. A fast response time will help eliminate the blurring of moving images and provide a smoother overall picture than a slower pixel response time. Technology has been developed to address the limitations of the current Gray-to-Gray (GtG) measurement of response times in terms of quantifying video play performance.
**Type of Response Time**

1. **Gray to Gray (GtG)**

Response time has traditionally been measured as the GtG for the LCD panel. The GtG measurement indicates how long it takes to switch a pixel from a 10% gray image to a 90% gray image. Panel response time for GtG is measured in milliseconds (ms) and a low pixel response time will help eliminate motion blur and provide a smoother overall picture than a higher pixel response time.

GtG is measured as the time needed to shift from a 10% gray to a 90% gray image.
2. Moving Picture Response Time (MPRT)

Moving Picture Response Time (MPRT) is a new technique to quantify accurately, the true degree of motion blur a viewer senses when looking at the edge of a moving object displayed on an LCD screen. MPRT is the duration of time from the point at which motion blur arises in the contour of an image to the time it disappears, as expressed in milliseconds (ms). MPRT is an accurate and realistic method to measure the response time of video and is an important consideration when watching movie content on monitors.

Why MPRT?

Camera captures moving images as the naked eye recognizes

How to measure MPRT

MPRT is measured by the blur width of the moving picture to quantify the actual response time
What is conventional motion blur reduction technology?
Impulsive scanning technology eliminates motion blur on an LCD monitor

LCD monitors traditionally used hold type display technology that was susceptible to motion blur issues. When watching regular video, motion artifacts are less of an issue; however, pc gaming (especially for FPS games or MMORPG games) requires the reproduction of smooth movements in all axes of the computer screen. New advanced techniques now allow LCD monitors to flash backlights with impulsive scanning technology that involves synchronizing the image frames. The application of impulsive type display technology to monitors results in less motion blur in images and a cleaner visual presentation that is essential for the instantaneous split-second decisions that gamers make.

**Conventional LCD**

![Conventional LCD diagram](image1)

**Motion artifacts occur between each frame**

**LCD with Impulsive scanning technology**

![Impulsive scanning technology diagram](image2)

**Reduced motion artifacts by synchronizing each frame with the backlights**
Samsung’s advanced motion blur reduction technology

Generic impulsive scanning technology flashes the backlights from the back of the display panel to the liquid crystal screen once as it passes through the center; however, detectable motion blur remains in the top and bottom of the axes of the monitor.

Samsung’s superior technology involves the optimal application of 4 channel impulsive scanning technology that creates clean images in all areas of a curved monitor. The backlights of the LCD screen are activated in 4 timing areas; therefore, the curved screen can reduce motion blur by dividing the display into 4 sections that enable a 1ms MPRT. Samsung’s unique and revolutionary motion blur reduction technology has achieved an astonishing 1ms MPRT on a curved monitor.

**Summary**

Samsung’s impulsive scanning technology provides response times that are second to none and represent the most advanced technology available for curved monitors. Impulsive scanning technology is unique to Samsung’s expert-level gaming monitors that are designed to specifically appeal to gamers. Serious gamers can gain a distinct advantage from a curved monitor with impulsive scanning technology on a VA panel that provides visual information at an instantaneous 1ms response time for split-second decisions. Gamers will instantly benefit from an out-of-the-box expert-level performance that allows them to “Rule the Game”.
For more information

For more information about Samsung Curved Monitor CFG70
www.samsung.com/monitor or
www.youtube.com/samsungmonitorglobal