

# AP/LCD technology

## A form factor and performance breakthrough

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LCD imaging technology has proven to be a solid choice for use in rear screen projection cubes, fueling the growth of both the Business Messaging and Consumer Messaging markets. With no convergence, high-brightness and good color uniformity, LCD has broken into the marketplace strongly. In addition to its advantages as an imaging medium, LCD offers the widest range of supply choice, enabling competitive cost management and spurring a wave of on-going product development that promises continuous performance improvements long into the future.

However, early renditions of LCD imaging had a few issues such as high power consumption, and short lamp life. Advanced Performance Liquid Crystal Display (AP/LCD™) technology is the latest display technology breakthrough from Clarity Visual Systems that answers these issues and validates the progression of long-term LCD improvements. AP/LCD is a proprietary collection of optical elements that combine to give outstanding image quality, performance, and contrast in a rear projection display system. AP/LCD optimizes light efficiency and enables form factors as small as 16" deep.

Clarity's AP/LCD technology was designed for use in multi-stacking digital wall and digital signage applications. It yields superior performance over other display technologies in:

- Brightness uniformity – across a single display or an array.
- Color uniformity – across a single display or an array.
- Contrast – the dynamic range of the display. The ratio between the brightest white and darkest black.

### Defining image quality

Brightness uniformity, color uniformity and contrast ratio are identified as the most important parameters affecting overall image quality in multi-stacking display applications.

### Uniform images

Many displays can exhibit some degree of non-uniformity across the screen. When viewed in stand-alone applications with normal image content, a small amount of non-uniformity is hardly noticeable. However, when displays are placed next

to each other in multi-stacking wall or banner configurations, non-uniformity in adjacent displays can destroy the integrity of a single large image spread across multiple displays.

### Contrast ratio

Although much attention has been given to the absolute brightness of an image upon a screen, contrast is the factor that contributes most to perceived image quality. Too often an electronic display has poor black level performance with images appearing to be “washed out;” – the blackest black is noticeably gray and details in the dark area of the picture become lost. Overall, we characterize this as a lack of image “depth” or “punch.” By improving the performance of the black level (i.e. the contrast ratio), perceived image quality is vastly improved.<sup>1</sup> When audiences are shown two different displays, one after another with the same image, a majority of the people will prefer the one with a higher contrast ratio even if its absolute brightness is slightly less.<sup>2</sup> This is the power that high contrast has in overall image quality.

### The advantages of AP/LCD

Clarity's proprietary AP/LCD display technology delivers both superior color uniformity and superior contrast ratio. Clarity's LCD displays are designed using a single direct view LCD panel. With single panel direct view LCDs, the red, green and blue sub pixels reside within a single imaging device, eliminating the color convergence issues seen with three panel (RGB) imaging systems.

With AP/LCD Clarity is able to improve contrast capability in the LCD rear projection display. This is done with advanced polarization and careful control of the light path angles through the imaging device. With AP/LCD, Clarity is able to deliver contrast ratio performance of 1500:1. This is five to ten times better than the contrast ratio of other display technologies. Due to the increased efficiency of advanced polarization, AP/LCD can utilize low wattage ultra long-life bulbs, reducing cost of ownership and lowering power consumption.

**clarity**<sup>®</sup>  
visual systems

<sup>1</sup> Clarity Visual Systems (June 2000) A Framework for Image Quality Perception

<sup>2</sup> Clarity Visual Systems (June 2000) Screen Technology and the Quality Viewing Metric

Clarity bases its new line of displays on market proven LCD technology, offering the widest choice of size and native resolution, and selects the optimum imaging device from a wide variety of choices to meet the overall performance requirements of a particular display. Imaging devices based on other technologies are very limited in the choice of sizes and resolutions available.

Other rear-projection display technologies have difficulty delivering large physical image sizes in shallow form factors while achieving uniform brightness and color *and* delivering high contrast images. These technologies may exhibit one or another of the necessary image quality criteria, but fall short on others. For example: Three Panel Poly Silicon exhibits poor color uniformity, and DLP is known for poor contrast performance.

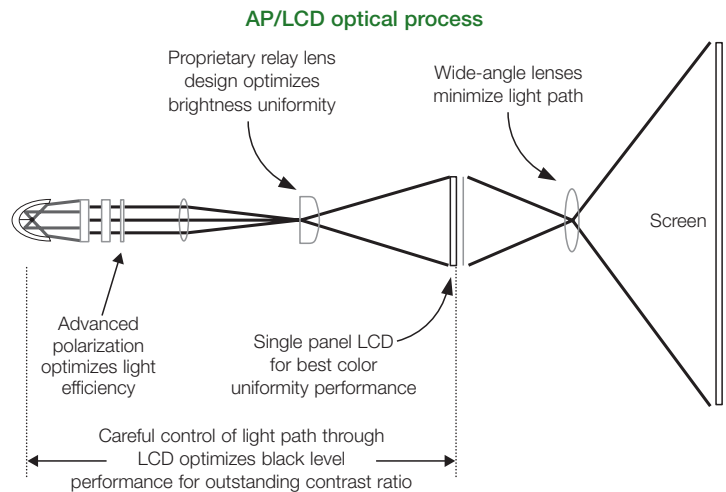
	AP/LCD	3 Panel PolySi	DLP	LCD
Brightness Uniformity	Good	Good	Good	Fair
Color Uniformity	Outstanding	Poor	Good	Good
Contrast Ratio	Outstanding	Fair	Fair	Fair

### The advanced features of AP/LCD

AP/LCD is considered “advanced” because the entire optical design works together to optimize the light path from the lamp, to the proprietary lens elements, to the imaging device and finally to the screen. The use of advanced polarization, a way to more efficiently use the light energy through the LCD imaging device, helps AP/LCD enhance performance of key elements while using lower watt lamps and power consumption. Through proprietary lens designs and careful control of the optical processing path, brightness uniformity and outstanding contrast performance are achieved without compromising a shallow form factor.

Advanced performance comes not from individual optical elements, but rather from optical elements working together as a system to optimize image quality and performance of

the entire light imaging system. Because of the wide variety of imaging sizes and resolutions possible with LCD technology, Clarity’s AP/LCD design enables form factors that can be optimized for specific market applications. For example, the Leopard (VN-3820-V) AP/LCD display is designed with a 10-degree downward slant for overhead banner viewing, and the Wildcat (WN-4030-S) AP/LCD display is optimized for wall applications where minimal depth (16”) and lighter weights are required.



### Summary and conclusion

AP/LCD provides superior color uniformity and native resolutions through the use of single path direct view LCD technology. It provides outstanding contrast ratio performance (1500:1); five to ten times better than other display technologies. Brightness uniformity is maintained without sacrificing a minimum footprint. Overall AP/LCD is an optimum solution, comparably priced with other display technologies on the market today, for the large-scale digital wall and digital signage industries.



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**Clarity Visual Systems, Incorporated**  
 9025 S.W. Hillman Court, Suite 3122  
 Wilsonville, Oregon, 97070, USA  
 Phone: 503-570-0700  
 Fax: 503-682-9441  
<http://www.clarityvisual.com>

