

Active retarder 3D displays

APPLICATION NOTES

Introduction

Today two major technologies are commercialized for direct viewing of stereoscopic 3D content on flat panel displays. One is based on time-multiplexing of the 3D images together with active shutter glasses worn by the observer. The active glasses and the display operate in synchronism, and each lens in the glasses alternatively passes to and blocks from the observer's eye images sequentially presented during alternate subframes. In the other technology a passive, patterned optical film is attached to the outer surface of the display to spatially separate left and right eye images. The two images are shown simultaneously on odd and even rows of the display, and the patterned retarder encodes them with orthogonal polarization states. Now each eyepiece of the viewing

glasses is equipped with a passive decoder, to analyze the state of polarization of incident light carrying the left and the right eye images to block or pass them so that the images reach, respectively, the observer's left and right eye.



Problem

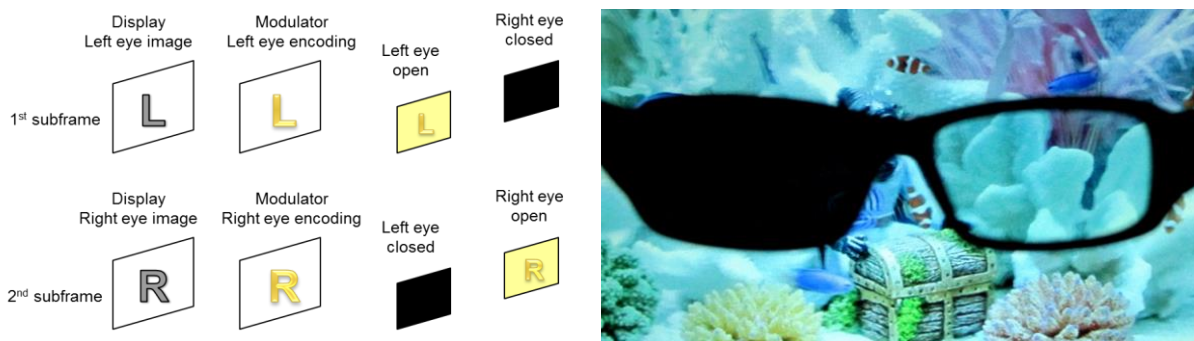
Active shutter glasses technology suffers from intrinsic drawbacks such as the inconvenience of wearing heavy shutter glasses, dark 3D images, and potential flickering arising from light sources present around the display. The main limitation of the patterned retarder technology is that the vertical 3D resolution is reduced to half of the display's native resolution.

Solution

To overcome the disadvantages of the two technologies described above a third alternative is proposed. The so-called active-retarder 3D display combines the advantages of patterned retarder technology enabling the viewer to wear light-weight, stylish and flicker-free passive glasses without compromising the resolution of the image source.

The technology is based on time-multiplexing of left and right eye images and the positioning of a screen-sized active retarder, or polarization modulator, in front of the display panel. The polarization modulator and the display operate in synchronism so that the left and right eye images presented frame-sequentially by the display have different polarization states imparted by the polarization modulator.

LC-Tec's fast-switching **X-FPM(500COP)** modulator is designed to be fully compatible with readily available passive circular polarization glasses used for 3D cinema and 3D TV. The fast switching enables short dark intervals between left and right eye images, leading to minimized brightness loss. The modulator enables symmetric operation between the left and right eye images as well as high contrast ratios between the open and closed states for both eyes, resulting in a high-quality 3D experience with low crosstalk.



How the observer would see the display through a pair of passive circularly polarized viewing glasses during the right eye subframe.

Target applications

- ✓ Ophthalmology
- ✓ Medical
- ✓ Scientific
- ✓ Industrial
- ✓ Gaming

X-FPM(500COP) advantages

- ✓ Full resolution
- ✓ Passive glasses
- ✓ Fast switching
- ✓ High contrast

Main characteristics

	X-FPM(500COP)
Transmittance*	80%
Contrast*	200:1 both eyes
Switching time (R→L/L→R)	50µs/2.5ms
Temperature range	-10°C to +60°C
Size	Custom designing up to: 19.6" diagonal in 4:3 aspect ratio 18.0" diagonal in 16:9 aspect ratio

*: When analyzed through circular polarizers. Incident light is linearly polarized.

** : If faster switching is required, LC-Tec's patented PolarSpeed®-M technology offers symmetrical 30µs/30µs switching.

For more information, please contact us at: info@lc-tec.se.