

Reflective LCD Devices

New 0.61-Type Full HD “SXR” Device Realizes the High Frame Rate of 120 Hz

SXR221

In recent years, the video projector market has been growing along with the increasing demands for large screen home TVs. In this large-screen environment, there are now increasing demands for clear picture quality with minimal blurring and softening for sports, action, and other scenes with rapid movement. To respond to these needs, Sony has now developed the SXR221 high frame rate “SXR”^{*1} device.

This device provides video rendition with an extremely low level of motion picture blurring, retaining the high picture quality already achieved by existing “SXR” products.

^{*1} “SXR” = Silicon X-tal (Crystal) Reflective Display



*: “SXR” and SXR are trademarks of Sony Corporation.

- Projection display device
- Diagonal 1.54 cm (0.61-type) display
- Number of pixels: 1920 (H) × 1080 (V)
- LCD response time: 2.0 ms
- LCD drive frequency: 240 Hz
- Supports a 120 Hz frame rate
- Built-in device temperature sensor

Compared to the existing 0.61-type full HD SXR211 (developed in September 2005), the SXR221 doubles the LCD drive frequency to 240 Hz and can support a 120 Hz frame rate display. In combination with the extremely fast LCD response performance which was an early feature of this technology, this device can provide fine-grained video expression with extremely low levels of motion picture blurring in video display.

■ Features of the SXR Device

Sony’s “SXR” technology achieves high-speed response performance and high contrast due to the adoption of a normally black LCD with unique specifications and a thin LCD cell gap structure. These devices provide a natural and smooth film-like video image due to their narrow inter-pixel space structure. Due to these features, “SXR” devices are expected to

provide high picture quality performance rich in presence and are used in home use front projection, projection TV, and digital cinema projectors.

■ Improved LCD Response Speed

To improve motion picture quality even further, Sony made the response speed of this device even faster. It is known that in general the LCD response speed becomes faster inversely proportional to the square of the thickness of the LCD cell gap. The SXR221 achieves the faster LCD response speed of 2.0 ms due to the achievement of a thin cell gap by optimizing Sony’s original wafer-based panel assembly process. Thus Sony was able to produce more than adequate display performance for a high 120 Hz frame rate.

■ Newly Designed Noise Reduction Circuit

Achieving 120 Hz display requires transferring the data twice as fast as the conventional data rate of 60 Hz. As a result, the circuits become more easily influenced by the inductance of the wiring lines and the picture quality could be degraded. To resolve this issue, Sony developed an optimized structure for return current distribution for the analog signals and achieved high picture quality with extremely low noise levels.

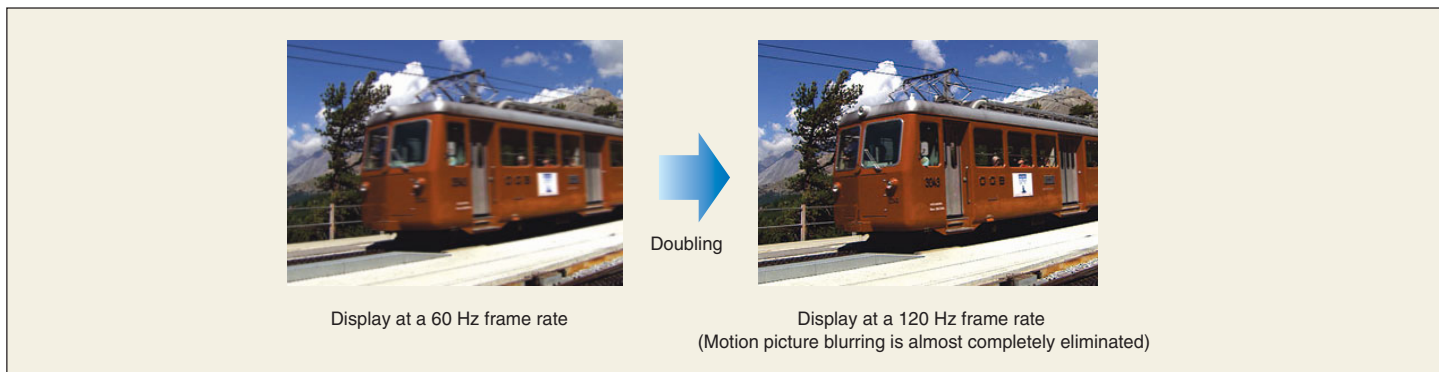
■ Multi-Dimensional Optimization of the Wiring Layout

To handle the doubled transfer capacitance, normally, the density of wiring on the silicon backplane peripheral area increases and the density difference with the internal of the devices increases. When this happens the surface height differences are aggravated and it becomes easier for imaging defects to appear. Therefore Sony optimized, in multiple dimensions, the wiring layout on the silicon backplane. In particular, all layers were optimized so that each wiring layer mutually complemented another, step heights between the pixel area and the circuit area and step heights in just the circuit area were minimized, and a high planarization was achieved in this device, which constrains the LCD cell gap.

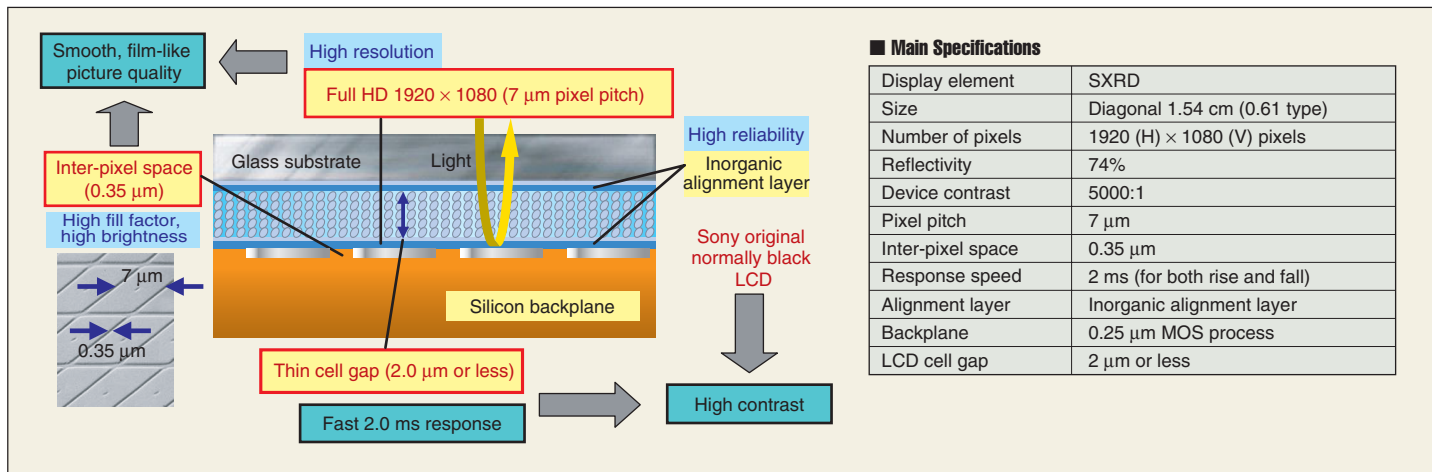
The Sony SXR device, which achieves, among other characteristics, the high contrast of 20,000:1 due to the use of Sony original optical technologies, will continue to evolve in the future.

V O I C E

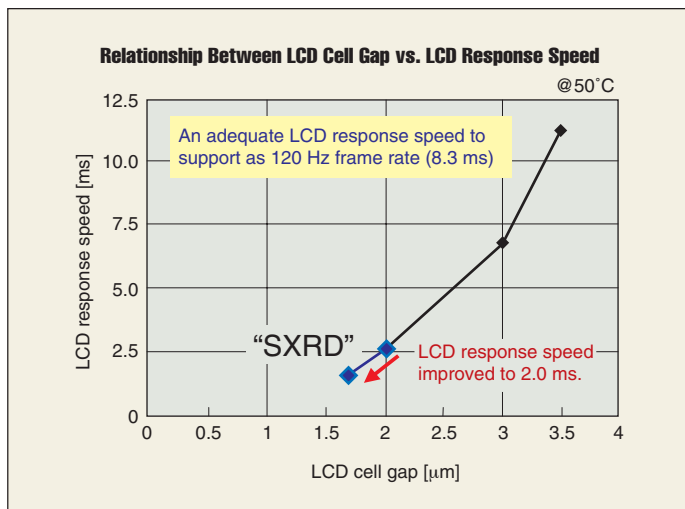
We succeeded in developing the industry’s first high frame rate micro-display device for projection. Projectors that include the “SXR” product developed here will allow users to enjoy previously unknown high picture quality images on large screens.



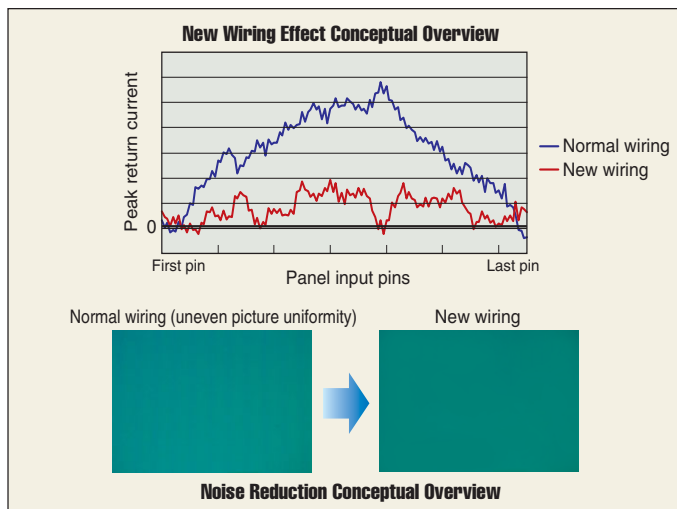
■ Photograph 1 High Frame Rate Effect Concept



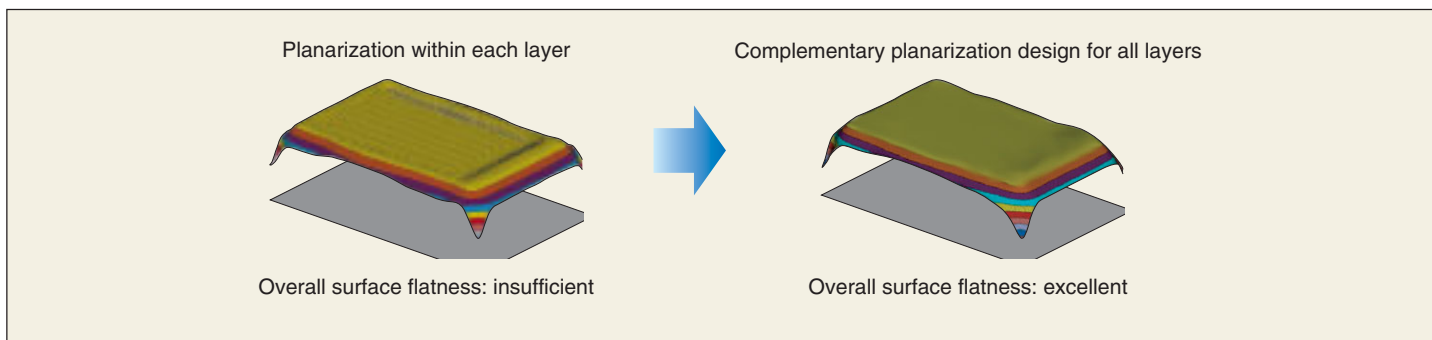
■ Figure 1 SXR Device Structure and Features



■ Figure 2 LCD Response Speed Improvements



■ Figure 3 Inter-Video Signal Interference Noise Reduction Circuit



■ Figure 4 Wiring Layout Multidimensional Optimization