Transflective 6.3 cm (2.5-Type) 210K-Dot LCD Panel
Provides Superlative Viewability in All Environmental Conditions

ACX500AKB

Sony has developed the ACX500AKB all-environment monitor LCD that is optimal for AV applications, such as camcorders and digital still cameras, that are used in a wide range of environments, from dimly lit interiors to bright outdoor locations.

Have you ever tried to film your children's fall sports events with a camcorder in the bright sun and found that the LCD was no match for the sun?

In addition to a transmissive mode that boasts superb picture quality, the ACX500AKB also provides a reflective mode monitor function, combining these in the same unit. Thus the ACX500AKB is a truly revolutionary LCD panel that can display brilliant images even in bright sunlight.

- **Transflective type LCD that can be used in any environment**
- **6.3 cm (2.5-type) 210K-dot high-resolution LCD monitor that provides a horizontal resolution of 480 TV lines**
- **Lower power consumption achieved by turning off the backlight outdoors**
- **Developed at the same time as the ACX311AKA transmissive LCD panel with the same pixel count.**
- **The CXA3549R single-chip drive system IC is being developed at the same time.**

Transflective Type LCD That Can Be Used in Any Environment

Conventional LCD panels are available in two types: the transmissive LCD panel, in which the image is created by light from a backlight, and the reflective LCD panel, in which the image is created by reflecting ambient light. These types are used for different purposes; the transmissive type is used when image quality is the most important issue, and the reflective type is used when use outdoors is the most important issue. Sony has now developed the ACX500AKB combined mode panel that provides both transmissive functionality and reflective functionality in a single panel. The ACX500AKB features fully adequate brightness for use indoors, and yet still provides more than adequate viewability when used outdoors. (See figure 1.) While the idea of creating a combined-mode LCD panel is not new, until now, the picture quality provided by combined-mode products has been far from adequate. Since conventional devices were required to include both a transmissive pixel and a reflective pixel within each pixel, the individual pixel performance was poor and as a result the overall picture quality was mediocre. Sony was able to overcome this difficulty by adopting their unique and superlative reflective technology in the ACX500AKB. (See figure 3.) Another problem is that the light passes through the color filters twice in reflective mode but only once in transmissive mode, making it difficult to balance color rendition between reflective and transmissive modes with the same color filters. This device uses unique Sony high-resolution color filter technology with a 6-color structure to achieve 6-color display. This makes independent optimized design in the reflective and transmissive systems possible, and made it possible to achieve both excellent transmissive mode characteristics (transmittivity: 3%) and reflective mode characteristics (reflectivity: 13%) at the same time. Reflective LCD panels can provide fully adequate viewability even in cloudy weather as long as they achieve a reflectivity of over 10%. Using an average backlight, this panel can achieve 150 nit, which is a fully adequate brightness level. (See table 1.)

V O I C E

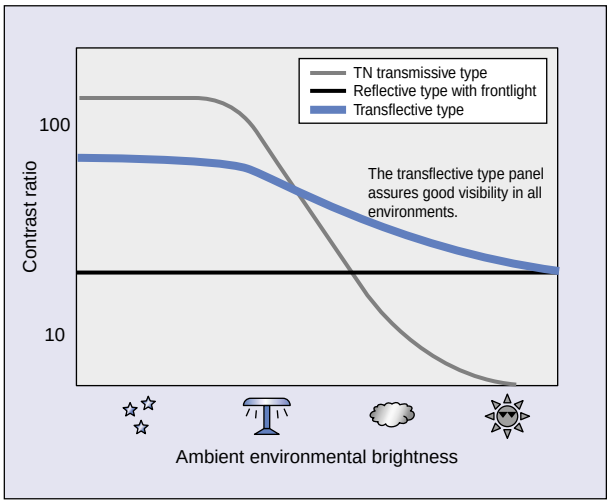
We developed a monitor that uses a transflective (combined transmissive/reflective) type panel for the first time in an AV application. To investigate easy-of-use issues, I found myself evaluating the image quality of prototypes outdoors every day the weather was good. I feel that these efforts paid off and enabled us to develop a monitor with balanced performance. I hope you will try this product at the beach in the summer, on the mountains, at fall sports events, or on the ski slopes in winter.

Lower Power Consumption

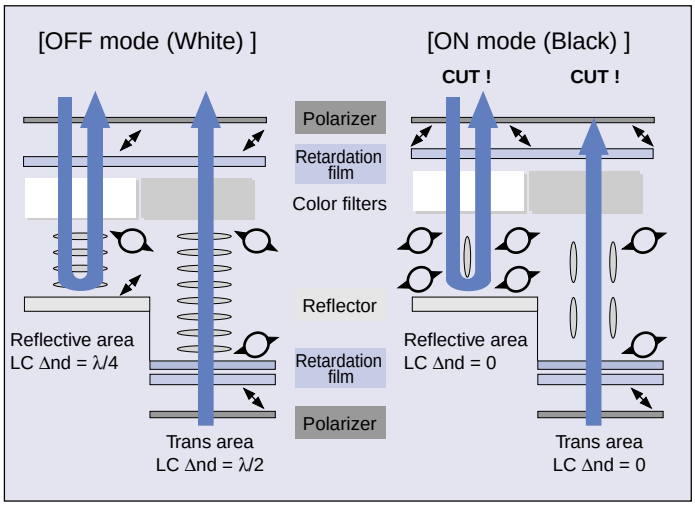
One feature of combined-mode (transflective) panels is that there is no need to turn on the backlight when using the panel outdoors. This reduces the power consumed by the backlight and extends the battery operating time of the end product significantly. Furthermore, since this panel is fabricated using Sony's low-temperature polycrystalline silicon technology, it inherits the features and functionality of that technology, such as narrow frame width, low power consumption, dual power supply system structure, up/down and/or right/left inversion functions, and a 16:9 display function.

Transmissive LCD: ACX311AKA

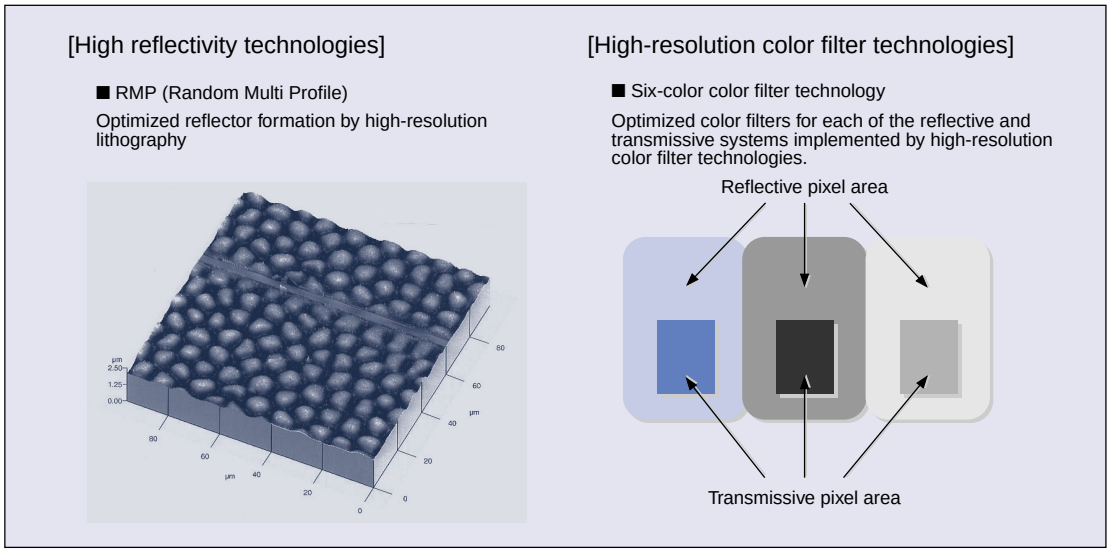
At the same time as developing the ACX500AKB, Sony has also developed the ACX311AKA transmissive LCD panel with the same pixel count specifications. Although the ACX311AKA is a transmissive LCD panel, it achieves a transmittivity of 7.8% due to Sony's high aperture ratio technology. Furthermore, the drive system for these panels has been simplified to a single IC. The CXA3549R dedicated drive IC supports both the ACX500AKB and the ACX311AKA.



■ **Figure 1 Panel Brightness vs. Visibility (Conceptual overview)**



■ **Figure 2 Transflective Type Panel Operating Principles**



■ **Figure 3 Sony Technologies that Support Advanced Transflective Panels**

■ **Table 1 ACX500AKB and ACX311AKA Basic Specifications**

Item	ACX500AKB Transflective type color LCD	ACX311AKA Transmissive type color LCD
Pixel size	50.1 mm (W) × 37.3 mm (H); 2.5-type	50.1 mm (W) × 37.3 mm (H); 2.5-type
Aspect ratio	4 : 3	4 : 3
Number of effective dots	960 (H) × 220 (V): 211,100 dots	960 (H) × 220 (V): 211,100 dots
Dot dimensions	52.25 µm (H) × 170µm (V)	52.25 µm (H) × 170 µm (V)
Number of colors	Analog full color	Analog full color
Horizontal resolution	480 TV lines	480 TV lines
Transmittivity (typ.)	3.0 %	7.8 %
Transmissive contrast ratio (typ.)	80 : 1	200 : 1
Reflectivity (typ.)	13.0 %	
Reflective contrast ratio (typ.)	20 : 1	
Supply voltage	Single 12 V power supply	Single 12 V power supply
Power consumption (typ.)	0.05 W	0.05 W
Panel outside dimensions	55.74 mm (W) × 46.29 mm (H) × 2.1 mm (t)	55.74 mm (W) × 46.29 mm (H) × 2.1 mm (t)
Other functions	Up/down and/or right/left inversion functions, PAL, Supports 16:9 decimated display.	Up/down and/or right/left inversion functions, PAL, Supports 16:9 decimated display.
Operating temperature	–10 to +60°C	–10 to +60°C
Storage temperature	–30 to +85°C	–30 to +85°C