Effect of Polarizer with Various Haze Value on the Optical Properties of TFT-LCD

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Abstract

A thin film transistor (TFT) type LCD has been used to public welfare-related equipment such as a personal computer, word processor, and OA table television set, and expected to further expand its market. Except from the twisted nematic (TN) mode LCD, recently a vertical aligned (VA) mode using a vertical alignment film has been widely used to TV set [1].

Among the optical characteristics, contrast ratio has been realized to be influenced seriously by the surface treatment of polarizer. In Hong et al. (2) various kinds of surface treatment for polarizer including hard coat (HC), anti-glare (AG) has been propped to evaluate the influence of surface treatment of polarizer on the optical characteristics. A schematic illustration to explain the principle of the surface treatment of AG is shown in Fig. 1.

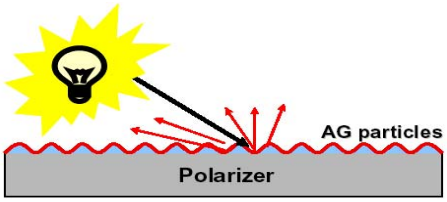

Figure 1. Structure of polarizer with AG (anti-glare) layer

AG polarizer has a hard-coat dispersion layer (may be not), which forms fine undulations. These disperse light in multiple directions, preventing light from directly entering the eyes and effectively eliminating glare.

In this paper, polarizer with various haze treatment was investigated to realize the influence of haze on the optical properties of LCD panel.

Based on the Figs. 2, 3 and table1, it can be concluded that as haze value increase, high CR can be obtained, and the light leakage (off-state) phenomenon could be improved.

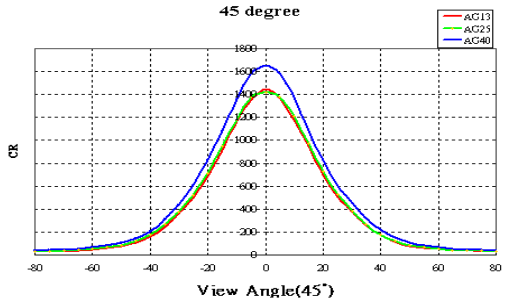

Figure 2. Comparison of contrast ratio with various haze value

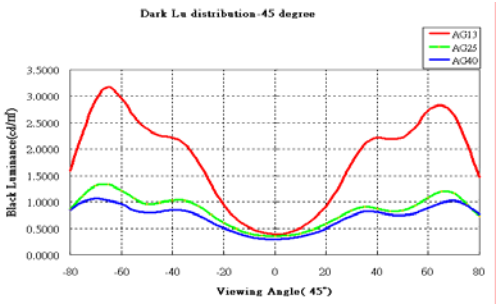

Figure 3. Comparison of dark luminance with various haze value

Table 1 Evaluation of optical properties

	AG13	AG25	AG40
View Cone	○	○	◎
CR	○	○	◎
White Lum.	◎	○	△
Off-State Light Lealage	△	○	◎
Color Dispersion	○	○	○
Color Shift	○	○	△

※ Order: ◎-The Best; ○-The Better; △-The Popular

References:

1. Takeda et al. U.S Patent No. 6661488.
2. Hong et al. U.S 6,956,699 B2.