HK2B-03 New LCD Development

80X80 Colour FSTN-LCD

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There are various kinds of Liquid Crystal Display (LCD) technologies in the market. Twisted Nematic (TN) LCD is the lowest cost and most mature, providing high display contrast. However, with a 1/16 maximum duty cycle, TN-LCD is limited to displays showing low information content. Supertwisted Nematic (STN) LCD is also a low-cost material and mature technology, providing good contrast for medium- to high-information-content displays portable device monitor.

Display with high information content provides a strong visual connection between human and computer. Therefore, our project involves whole process of making a 80X80 Colour Film-Supertwisted Nematic (Colour-FSTN) LCD, including LCD simulation and optimization, fabrication of LCD panel, driving circuit and system design as well as graphic user interface communication with computer.

In this project we need to make a transmissive LCD panel with high information content. Apart from that we also need to make it colorize and with a wider viewing angle and cost effective. Our simulated result shown we can achieve 1/80 duty ratio, high contrast over wide viewing angle Colour STN-LCD. Besides, we used two retardation films to further improve the viewing angle and contrast ratio.

Fig. 1, Spectrum of our C-FSTN
Fig. 2, TVC of our C-FSTN
Fig. 3, Viewing Angle of our C-FSTN
In order to control the Colour FSTN Panel, a hardware driver circuit is needed. The whole driver circuit consists of the Microprocessor, Voltage Regulator and Voltage Ladder. The corresponding schematic is shown in Fig. 4.

After finished the design of the schematic, a Computer Aided Design (CAD) Tool, Protel, is utilized for the design of the PCB Layout. Fig. 5 shows the PCB layout of the driver.

We also need to implement a driver system to display the patterns or datum from computer. This system is firstly generating a hex data from user in computer. Through the serial communication, data will be sent to Master Processor of the panel. Inside the panel, it is implemented with a software assembly program to display the data by controlling row and column drivers.

The Block diagram of the system is shown in Fig. 6.
We have implemented a new module for 80X80 Colour FSTN successfully. It possesses a good viewing angle with high contrast ratio. The photos of our product are shown in the following figures:

Fig. 7, Our Colour FSTN panel (Direct View)  
Fig. 8, Our Colour FSTN panel (Side View)  
Fig. 9, PCB board of display controllers with microcontroller, voltage ladder and voltage controller