



Drive method: Active matrix
Display mode: MD-TFD transfective color
Diagonal size: 1.9 inches
Pixel count: 132 x 162 dots
Display colors: 4096 colors
Power consumption: Approximately 3 mW

Product Features

Epson began full-scale production and shipping of the MD19SBT, an MD-TFD (Mobile Digital-Thin Film Diode) active matrix LCD panel module, in November 2000. This low-power panel module was the company's first active matrix LCD module to be developed for mobile phones.

The MD19SBT employed a transfective panel structure. In bright environments it worked in reflective mode and did not require any backlighting. In dark environments, on the other hand, it worked as a transmissive display, using a white LED backlight. The panel also employed a reflective layer technology called SPD (Single Polarizer Display) and a partial display driver, both of which were also used with the ECM-A1192, another color STN (super-twisted nematic, a type of liquid crystal) LCD panel for mobile phones. A RAM device was built into the panel module so that the LCD could still display images while the CPU was in sleep mode (when the mobile phone was in receive-ready mode). This helped to further reduce power consumption. In addition to the inner reflective structure, a dispersion layer was placed in the LCD panel to achieve more uniform light reflection and better contrast. Thanks to this technology, the high-contrast, low-power consumption MD-19SBT panel module rivaled active-matrix LCDs in terms of high-resolution display capability while operating on only about 3 mW, less than one-tenth the power required by conventional active matrix LCDs. The MD-19SBT also employed COG (Chip On Glass) and MCM (Multi Chip Mounting) packaging designs to minimize module size. This structure became the de facto standard for mobile phone LCD panels.

Background

Having started manufacturing LCD panel modules for mobile phones back in 1993, Epson was making deep inroads into this market by 1997, when the first mobile phones with Internet and email functionality appeared in Japan. It then became clear that color LCD panels would soon find strong demand in the mobile phone market. Consequently, late in 1997, Epson started developing reflective color LCD panels that would provide what mobile phone manufacturers were looking for in an LCD panel module: low power consumption combined with a color display. This development project produced the reflective color LCD panels that are used in both passive-matrix and active-matrix LCDs. The technology for this inner reflective display was named SPD (Single Polarized Display). The first product to use this technology was the ECM-A1192 STN color LCD panel, introduced in November 1999. The following year, the MD19SBT was introduced as an MD-TFD active-matrix display for high-resolution display of color images.

Impact

Like their TFT cousins, MD-TFD panels are a type of active matrix display. But MD-TFDs are simpler in construction and have fewer electrodes. This translates into a higher aperture ratio and higher light usage efficiency. MD-TFD displays were exactly what mobile phone manufacturers were looking for in an active-matrix LCD, and they have been very well received in the marketplace for their high resolution, fast response and low power consumption. Mobile phones equipped with MD19SBT displays were very warmly received when they made their debut in the Japanese market in March 2001, and after that sales of mobile phones with MD-TFD color LCD displays skyrocketed. For Epson, this presented a new opportunity to take advantage of expertise gained in developing D-TFD and MD-TFD LCD displays for digital cameras and electronic games as it entered the mobile phone market. Since production of the MD19SBT began, Epson further refined its MD-TFD technologies and developed innovative new products such as Epson Color Modulation displays that support a panel of 260,000 colors while maintaining lower power consumption, along with new technologies such as Crystal Fine technology. As a result, Epson firmly established itself as a leading manufacturer of color LCD panels for mobile phones.