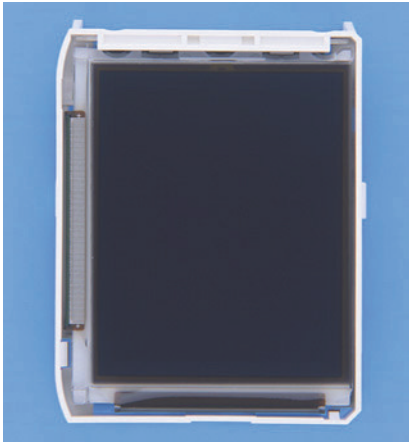


ECM-A1192

November 1999



Drive method: Passive matrix type
Display mode: STN transfective color
Dimensions: 34.7 x 40 mm
Pixel count: 96 x 120 dots
Display colors: 256 colors
Power consumption: 1.2 mW (420 μ A x 3)

Product Features

The ECM-A1192 was an STN (super-twisted nematic, a type of liquid crystal) transfective color LCD panel module developed to meet demand for high-definition color and low power consumption. This panel module went into full production in November 1999, just in time for the Japanese boom in internet- and email-ready mobile phones. The ECM-A1192 employed a transfective panel structure so that in bright environments it worked in reflective mode and did not require any backlighting, while in dark environments, it worked as a transmissive display, using a white LED backlight.

Thanks to the development of partial display (partial drive) technology, power consumption was lowered to just 1.2 mW when the phone was in receive-ready mode. Conventional reflective panels were attached to the exterior of the panel substrate, so that incoming light had to pass through the liquid crystal layer, color filters, and panel substrate before being reflected by the reflective layer. After that, the reflected light passed back through the panel substrate and color filters, but this reflected light was dispersed to the extent that it also passed through adjacent color filters with different colors, and the result was a slightly blurred filtering of colors that reduced contrast due to the phenomenon known as "parallax." To resolve this problem, Epson developed a technology whereby a highly reflective and highly corrosion-resistant reflective layer composed of an aluminum-neodymium alloy was placed directly beneath the color filters inside the LCD panel. Using this SPD (Single Polarizer Display) technology, Epson succeeded in developing a display that reduced parallax while providing high contrast and excellent color reproduction. This led to the development of the ECM-A1192 as a 256-color, 96 x 120 dot STN panel.

Background

Having entered the business of manufacturing LCD panel modules for mobile phones back in 1993, Epson had made deep inroads into this market by 1997, when the first mobile phones with Internet and email support 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 got to work 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 was carried out in cooperation with a number of materials and product manufacturers, found new ways to optimize color reproduction in color STN panels. As a result, not only did Epson adopt highly anti-corrosive aluminum-neodymium alloy as the reflective plate material, it also adopted a newly developed etching material for reflective layer formation and an AR (Anti-Reflection) technology (originally developed by the company's plastic corrective lens business as a coating technology) to coat the mobile phone's cover glass for improved panel visibility.

Impact

Mobile phones featuring the ECM-A1192 transfective color STN LCD panel module made their sales debut in January 2000, and thanks in part to their beautiful color display screens these phones became a major hit on the Japanese market. As a result, Epson shipped more than 2,740,000 of these panels, thereby firmly establishing its position as a leading manufacturer of color LCD panels for mobile phones. Moreover, Epson's development of this color STN LCD panel laid the foundation for its development of the MD19SBT, a mobile-digital thin-film-diode (MD-TFD) active matrix color panel for mobile phones.