

EMERGING TECHNOLOGIES

NEC ELECTRONICS AMERICA

NEC LCD TECHNOLOGIES



Innovative LCD solutions for emerging markets

NEC LCD Technologies has a long standing commitment to research and development of leading edge LCD technology solutions targeted for next-generation display applications. Our focus on customers is reflected in every aspect of our business – research, development, production, and marketing – and allows us to provide advanced display solutions that meet the diverse and sophisticated needs of industrial display and high-end monitor applications.

Some of our recent LCD technology innovations include LCD modules incorporating 3-dimension LCD technology, e-paper technology, viewing angle control technology and high color gamut technology.

3D Technology

This new technology enables 2-dimensional and 3-dimensional images to be simultaneously displayed on the same screen, at the same resolution, by changing the image data input. The displays are based upon a horizontal double density pixel (HDDP) structure with a lenticular lens.

Conventional LCDs typically have square pixels, with RGB sub-pixels distributed in vertical stripes. To produce 3D images using conventional pixel arrays, two pixels are needed to display the 3D image thus reducing the horizontal resolution by half.

With NEC's HDDP structure the RGB sub-pixels are rotated 90 degrees and divided in half to achieve double-density resolution. This yields a display capable of displaying both 2D and 3D images in the same resolution.

E-Paper Technology

Analysts expect e-paper to be one of the emerging display technologies to generate the next wave of growth in the display industry – including the industrial display market. E-paper modules feature higher visibility and grayscale gradations than most news papers or paperback books. NEC's e-paper modules leverage NEC LCD Technologies' experience and technology expertise with TFT active matrix structures to develop an e-paper module featuring 16 grayscale shades, excellent reflectivity and a high contrast ratio of 10:1.

www.am.necel.com/display

www.nec-lcd.com/en

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Environmental Initiatives**Our products are RoHS compliant.**

Out of concern for the environment, NEC LCD Technologies began reducing the use of hazardous substances in our LCD modules prior to the RoHS Directive. We have eliminated the six substances targeted in the RoHS Directive as well as other substances we have identified as potentially hazardous, so that our products are now RoHS-compliant.

Key features of e-paper displays:

- › High readability
 - Like paper, e-paper displays rely on reflected light thus permitting wide viewing angles
 - High readability in strong ambient light environments
- › Ultra-low power consumption
 - Does not use a high power light source such as a backlight
 - Once the image is displayed it can be maintained without applying additional power.
 - Electrical power is required only to update the display image and image updates consume very little power.
- › Slim design and lightweight
 - Simple structure compared to display devices using internal light sources

Viewing Angle Control Technology

NEC LCD Technologies viewing angle control technology makes it possible to change the display's viewing angle at any time and allows viewing angle to be set in accordance with the display environment or application requirements. A display can be operated in wide viewing angle mode to display information that is not sensitive or confidential. It can then be set to narrow viewing angle mode to display confidential content.

To achieve a narrow viewing angle, a voltage signal is applied to the viewing angle control element to focus the light from the backlight. This makes the image visible only to someone directly in front of the display.

High Color Gamut Technology

To address some of the specialized LCD requirements of the broadcasting and video industries, NEC has developed a high color gamut technology which achieves 100% of Adobe® RGB ratio. The new technology incorporates newly developed near ultra-violet based LEDs with fluorescent RGB color material and a wide color material color filter that results in high color reproduction. The resulting display achieves a high color gamut of 100% Adobe® RGB ratio.

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